Factors Affecting Adoption of eHealth in Egypt

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Abstract

This research investigates the factors that affect technology acceptance in the eHealth domain with regard to Egypt. It also focuses on the impact of the perceptions and attitudes of online privacy, due to the sensitivity of healthcare information, and trust, in addition to the other technology acceptance factors affecting acceptance of eHealth in Egypt. The aims of the research were to (i) understand the impact of general attitudes to online privacy and associated concerns on the acceptance and uptake of eHealth services, and (ii) to develop an enhanced technology acceptance model that takes into consideration factors pertaining to technology acceptance adopted from the UTAUT Model as well as online privacy, online trust and Internet experience factors.

Results from a questionnaire survey of a randomly selected sample of computer literate members of the general public revealed interesting correlations between users' acceptance of eHealth services and attitudes to online privacy, indicating that users' general attitudes to online privacy negatively affect eHealth acceptance. Factors pertaining to the UTAUT model such (performance expectancy, effort expectancy, and facilitating conditions) have a positive impact on potential acceptance. Furthermore, factors of online trust and Internet experience and exposure also show a positive impact on eHealth technology acceptance. Questions used to measure eHealth technology acceptance were adapted to the eHealth domain as well as to the Egyptian culture in order to reflect potential users' understanding of eHealth concepts.

The Unified Theory of Acceptance and Use of Technology (UTAUT) model (Venkatesh et al., 2003) was used as a foundation for testing factors of technology acceptance. Linked issues such as e-privacy threats such unauthorized use of personal information, privacy policies and regulations, and possible links with existing technology acceptance models in the eHealth context were also investigated. The research concluded that these additional factors of privacy and trust are relevant to technology acceptance in the eHealth context, and should be included in technology acceptance models.

The results of this research, in terms of recommendations made for eHealth, will directly benefit the Egyptian government; commercial services and eHealth researchers among others.

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Book Chapter

Book Title: eHealth: Legal, Ethical and Governance Challenges.
Co-authors: Carlisle George, Diane Whitehouse and Penny Duquenoy.

The book consists of approximately 159,780 words, 16 chapters and 25 contributors from Australia, Belgium, Italy, Slovenia, Switzerland, Spain, the UK and the USA. Found on a dedicated homepage as well as on Amazon (http://www.amazon.co.uk/dp/3642224733) and other booksellers. The eBook is available on SpringerLink, Springer's online platform. http://dx.doi.org/10.1007/978-3-642-22474-4.

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Glossary

Abbreviation	Full Word
AHIMA	American Health Information Management Association
AMI	Ambient Intelligence
B2C	Business To Consumer
BI	Behavioural Intention
CHIT	Consumer Health Information Technology
CSCW	Computer-Supported Cooperative Work
e-adoption	Electronic Adoption
e-book	Electronic Book
e-business	Electronic Business
e-clinic	Electronic Clinic
e-commerce	Electronic Commerce
e-communication	Electronic Communication
e-customers	Electronic Customers
e-marketing	Electronic Marketing
e-patient	Electronic Patient
e-privacy	Electronic Privacy
e-profiling	Electronic Profiling
e-therapy	Electronic Therapy
EE	Effort Expectancy
eGovernment	Electronic Government
eHealth	Electronic Health
EHR	Electronic Health Records
EM	Extrinsic Motivation
EMR	Electronic Medical Record
EMRO	Eastern Mediterranean Regional Office
EPR	Electronic Patient Records
FC	Facilitating Conditions
GP	General Practitioner
HCI	Human-Computer Interaction
HIP	Health Information Privacy
HIPAA	Health Insurance Portability and Accountability Act
ICT	Information and Communication Technology
IDT	Innovation Diffusion Theory
IM	Intrinsic Motivation

IT	Information Technology
MIMI	Medical Imaging and Medical Informatics
MOHP	Ministry of Health and Population
MPCU	Model of PC Utilization
P3P	Platform For Privacy Protection
PE	Performance Expectancy
PEOU	Perceived Ease of Use
PETs	Privacy-Enhancing Technologies
PHI	Protected Health Information
PI	Personal Information
PII	Personal Identifiable Information
PU	Perceived Usefulness
SCT	Social Cognitive Theory
SEM	Structured Equation Modeling
SI	Social Influence
SN	Subjective Norm
TAM (Davis, 1989)	Technology Acceptance Model
TIA	Total Information Awareness
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UCD	User-Centered Design
UTAUT	Unified Theory of Acceptance And Use of Technology
W3C	World Wide Web Consortium
WHO	World Health Organization

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Chapter 1- Introduction

This chapter presents an introduction to the research topic by providing an overview of the importance of technology acceptance factors when introducing new technologies such as eHealth. The chapter also presents the importance of online privacy, its definition, privacy concerns associated with online transactions and within the eHealth context. It then presents the research scope, research design, contribution to knowledge and an outline for the whole thesis structure. Lastly a summary of the chapter is presented.

1.1 Introducing the Research

This research investigates the notion of technology acceptance in the eHealth domain. In addition to the impact of technology acceptance factors, it also focused on the impact of added factors such as users online privacy attitudes, online trust, satisfaction with medical care and Internet Experience that might have an effect on the acceptance of eHealth in Egypt. This is because in literature, it has been emphasised that technology acceptance in general has several factors and antecedents. These factors will be described in detail in Chapters 2 and 4 where technology acceptance models will be discussed. Although privacy as a concept and privacy attitudes in relation to e-commerce have been heavily researched (reported on in Chapter 2), research has not been extensively undertaken in respect of eHealth. In this research Egypt as an example has been selected for two reasons: (i) access to data: Egypt is the researcher's home country allowing access to data sources, and understanding of cultural background (ii) Egypt is the largest country in the Middle East and Africa with Internet users, and the aim of the Egyptian government is to increase participation in the information society, including the health sector[1].

Due to the successful implementation of a 'free Internet' strategy in 2002, Egypt now has the largest Internet market in Africa. In Egypt the number of Internet users has increased from more than five million users in 2006, to 16,636,000 Internet users as of December 2009. Egypt has a population of 80,471,869 (2010), 21.1% of which are Internet users and 4,077,520 are Facebook users (August 31, 2010) with a 5.1% penetration rate (Internet world stats, 2010). Recent data as of 2012 shows that Egypt's population has increased to 83,688,164, with 29,809,724 Internet users (June 30 2012, 35.6%) and 12,173,540 Facebook subscribers (Dec 31/2012) with a 14.5% penetration

[1]In 1999, the government launched the Egyptian Information Society Initiative (EISI) to reduce the digital divide and convert Egypt to an information society. This initiative consisted of six parts: access, government, business, learning, health and culture (Sayed, 2004 in Abdelghaffar Ismail, 2008).

rate (ibid). However, Internet penetration is still relatively low and the vast majority of users are located in urban areas.

The sector is highly competitive with around 300 Internet and data service providers. A broadband initiative launched by the government in 2003 has increased the number of broadband connections ten-fold within three years and has brought 24Mb/s ADSL2+ access to residential households. VoIP Internet telephony has been liberalized and several companies are rolling out Next Generation Networks (NGN) to provide converged voice and data services (ibid).

With such population and growth of Internet usage across the years, Egypt is therefore an interesting area of research. The second reason is the experienced advances in Egypt regarding E-government where services like driver's license renewal, issuing of birth certificates in computerized form, and payment of public services are now working through the e-government portal of Egypt (electronic bawaba). This places eHealth in a challenging place for a developing country to take into consideration.

The United Kingdom, on the other hand, has a population of 62,348,447 and 51,442,100 Internet users (June, 2010) that is, 82.5 % of the population including 27,806,860 Facebook users (August 31,2010), with 44.6% penetration rate (Internet World Stats, 2010). The difference in figures between the two countries is an interesting area of study as comparing results available from the literature on the acceptance of eHealth in the UK and the findings of this research study in the same context in Egypt. Contrasts between the two regions may be due to cultural differences, such as in attitudes to Internet use and privacy and exposure and experience towards Internet services. Value differences between the west and the east have been emphasised by (Collste, 2008) who stated that if privacy is studied within the western context without relevance to the Asian context, problems regarding global Internet services would exist. Technology acceptance of eHealth may differ across countries, which may be due to cultural differences. In this research, factors employed to test technology acceptance reflected in the questionnaire were adapted to the Egyptian culture as well as to the level of awareness of eHealth in the country.

Figure 1.1 below displays a forecast for the global online population for the year 2014 showing a dramatic increase compared to 2009 (Internet Statistics Compendium, 2010). This places the research topic in a place of growing importance accompanying the online population growth worldwide. This growth in population will be accompanied by growth in services over the Internet and an increase in importance of eHealth as a service that is promoted by governments to encourage citizen e-participation in everyday life. However, the eventual decision to adopt and accept (i.e. use on a regular

basis) a certain technology is not always obvious, and this issue of ICT acceptance also plays an important role in health care. In order to break down any barriers for the implementation and usage of ICT in health care, it is therefore necessary to gain more knowledge on the relevant factors that may foster or hinder the extent to which individuals are willing to accept technology in health care settings.

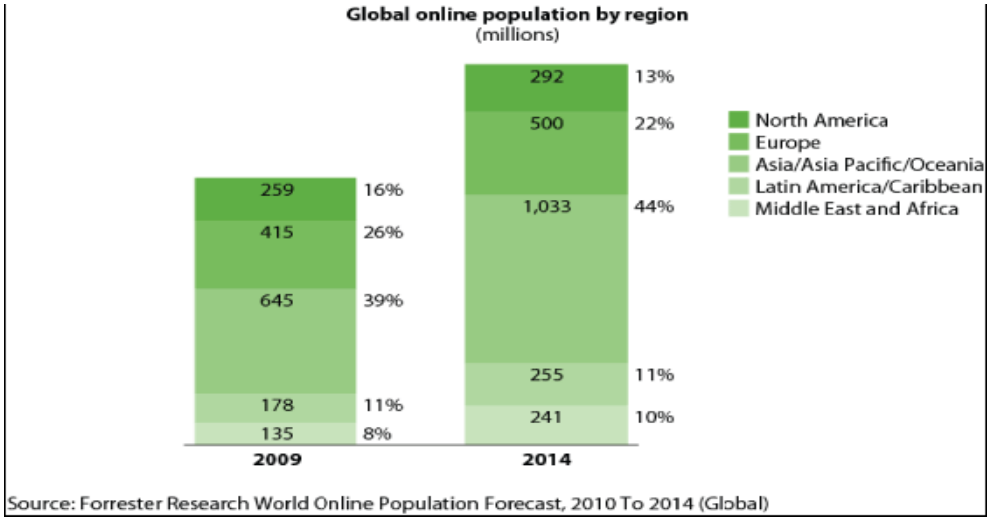


Figure 1.1 Internet Statistics Compendium, 2010

1.2 Research Background - Privacy, Technology Acceptance and eHealth.

Regarding acceptance of eHealth technology, this research studied factors pertaining to a well-known technology acceptance model (UTAUT), which will be highlighted in the next section. This research also tackles attitude to e-privacy as one of the factors that affect eHealth technology acceptance. Furthermore, online trust has been highlighted in various studies as a factor that affects newly introduced technologies as the case of eHealth in Egypt. In addition Internet experience and exposure was also studied as a factor that affects technology acceptance. The following section will discuss the importance of privacy in technology acceptance of eHealth followed by a discussion on technology acceptance factors that were adopted from the UTAUT model by (Venkatesh et al., 2003)

1.2.1 Privacy Definitions and Concerns

Privacy is the ability to control the acquisition and use of one's personal information (Liu, et al., 2004) and control over information is a key dimension of privacy stressed by researchers in diverse disciplines including law, Information Systems, marketing, organizational, social sciences, and psychology (Hann et al., 2002). It is also the individual's right to control the circulation of his or her information (Collste, 2008); information privacy relates to an individual's right to determine how, when, and to what extent information about the self will be released to another person or to an organization (Hung, 2005, Yee et al., 2006).

In the previous literature on privacy and technology, considerable attention has been paid to online privacy issues and concerns involving the Internet and the World Wide Web for personal privacy (Tavani, 1999). Privacy is probably the most discussed issue within ICT ethics with a general agreement among ICT ethicists about the importance of privacy. Although health care seekers are attracted to the Internet, which is perceived to offer anonymity and a place to seek information, business models depend on tracking users and might be even without the person's knowledge or consent. eHealth companies maintain and develop databases with users profiles including information like health status, insurance information, and purchasing patterns. There is concern that such information collected is tempting to use for purposes other than those stated (Goldman & Hudson 2000). Concerns over privacy are not new. Although businesses have been collecting user's information for years, yet privacy concerns often arise when new IT is introduced (Liu et al., 2004). Privacy concerns are not just for e-commerce transactions but also include concerns over healthcare web sites that are subject to electronic medical computer break-ins, insider and hacker attacks, temporary and careless employees, virus attacks and system design faults (Fung and Paynter, 2006). Furthermore, privacy concerns and privacy attitudes of people in turn have been used interchangeably. The notion is peoples' attitudes towards online transactions in general are a result of the privacy concerns that people might foresee.

In this research, as mentioned earlier, attitudes to online privacy was needed to be considered, where these attitudes in turn might affect the acceptance of eHealth in Egypt. This has been scoped particularly in order not to confuse various concepts together like privacy in general, perceptions, attitudes, behaviour, and beliefs. In order to conduct a clear investigation of the effect of online privacy as a factor that might affect the acceptance of eHealth in Egypt, it was necessary to focus on attitudes in particular towards online transactions, which indeed reflect the amount of concern that people might have or experience. Further explanations will be highlighted in the next

chapters. Some researchers like (Jensen, 2009; Liu et al., 2010) have used privacy attitudes and privacy concerns as one entity that reflect each other.

Furthermore, other researchers have noted that consumers now view privacy as the most important issue (European Commission, 2010). Further emphasis is on the issue that users now view privacy as the most important issue, even more important than speed, spam, and space on Internet activities (Merkow & Breithaupt, 2002).

1.2.2 - Technology Acceptance and eHealth

In the context of eHealth, understanding the reasons of Internet usage for health advice has grown in importance (Briggs et al., 2005). Goldman and Hudson, (2000) stated that consumer focused services of traditional healthcare activities, are migrating to the Internet, such as recruitment for clinical trials, fulfilment of prescription drugs, applications for health insurance, and even consultations with medical care providers. The number of American adults accessing health information online had doubled to ninety-eight million by the year 2000 (ibid).

The increased use of the Internet and latest information technologies is placing major changes on the healthcare industry by improving services and reducing cost. These advances allow patients to search for healthcare information and interact with physicians (Fung and Paynter 2006). Technology, as much as it may help, it may also hinder. User's perception and attitudes regarding potential violation of privacy has emerged as a key factor that affects technological acceptance and adoption (Patil et. al., 2006).

The notion of Ambient Intelligence (AMI) systems used to enhance the accessibility of health care to support a modern lifestyle in a non-invasive way may well have benefits, but trade-offs in terms of the collection of information may need to be made. The type of concerns raised make developing innovative design principles including guidelines for privacy, security, user awareness and user control a must (Adams et al., 2008).

eHealth technology acceptance could be perceived as an application of new technology in the medical field for example an improved X-ray scanner, an advanced wheelchair, or some kind of operating or monitoring device (Beekens, 2011).

In this research acceptance of eHealth is based on new services that could be accessed through the Internet, for example: booking appointments online, online prescription, access of online medical test results and interaction with health care

providers. When ICT is applied in health care, it is known as telemedicine, medical informatics, or eHealth. Figure 1.2 shows how the terms are related. As can be seen, eHealth and tele-health are considered to be part of the same.

Telemedicine includes products and services mainly to enable the communication between people in health care for example: video monitoring by home care nurses, email-consult services with general practitioners (GP's), the health information and medical informatics category mainly focuses on the information rather than the communication process between two parties. Telemedicine is linked to ICT whereas health information category provides information with the availability of IT for example: administrative support services, the digitalization and distribution of X-ray pictures in a database or the provision of health care related information on the internet for patients and interested parties (Beekens, 2011).

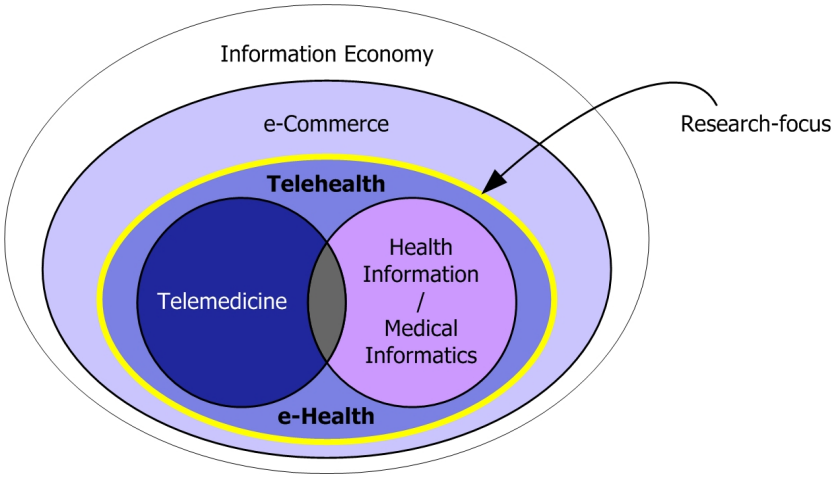


Figure 1.2 – Positioning of the definitions of telemedicine, e-Health and health information (Beekens, 2011)

In order to understand technology acceptance of eHealth, this research therefore employed a well-known technology acceptance model – UTAUT by Venkatesh et al., 2003). The Unified Theory of Acceptance and Use of Technology (UTAUT) is a model examining the major factors affecting the acceptance of newly introduced technologies and it is based on TAM by (Davis et al., 2000). The UTAUT includes four constructs (factors): performance expectance (perceived usefulness of the technology), Effort expectance (perceived ease of use of the technology), Facilitating conditions (availability of resources to use the technology technology) and Social Influence (how important others may influence a user to accept the technology). The research also added other factors in addition to the previous that were anticipated to impact the acceptance of eHealth. The added factors are: attitudes to online privacy (since the

context is eHealth, therefore privacy as emphasised by many may affect the acceptance of a technology when online) where *Privacy concerns may limit the potential of E-commerce transactions* (Liu et al., 2004), online trust (which is needed when a technology is newly introduced, people who trust online transaction may accept a newly introduced online technology), Internet experience and exposure (Users that accept the technology need to be those with some Internet experience to clearly understand the meaning and perceive the benefits of technology) and finally satisfaction with medical care (people who are satisfied with their health care providers might accept offerings (use of eHealth) from their doctors, therefore satisfaction affects social influence which might affect acceptance of eHealth). These factors have been addressed through widely used technology acceptance models and theories, which are discussed in coming chapters.

1.2.3 - Technology Acceptance Factors and eHealth in the Egyptian Culture

Technology acceptance factors studied in this research needed to be adapted to the Egyptian culture. For example, those originating from the UTAUT were quite broad in definition, and when tested needed to be emphasised and adapted to: 1) First the eHealth context and 2) Second to the Egyptian culture and level of eHealth awareness in Egypt.

In order to understand aspects and issues associated with the ehealth initiative in Egypt, interviews were conducted with officials working at the Ministry of Health and Population (MOHP). eHealth technology is new to Egypt and hasn't been introduced as an official governmental service. Therefore in order to examine the factors that affect technology acceptance of eHealth the following needed to be considered:

1- Meanings of the UTAUT constructs and adapting it to the eHealth context.
2- Level of awareness of eHealth in Egypt, therefore questions used in the questionnaire measuring the factors needed to be elaborated upon, to be clearly understood by respondents, accurately test the factors and avoid misleading results that may accompany misunderstanding of the underlying factors.
3- The target sample is characterized as technology literate or even more specific computer literate/Internet users. This selection criterion not just filters the population but is of necessary existence due to the limitation facing the research from high illiteracy levels in Egypt and it being a developing country.

4- Users of eHeatlh in this research scope around anyone just seeking information on a health condition online, or whether interacting with healthcare workers, e.g. a doctor.

First, there is a wide range of views about the meaning of privacy and whether there is a right to privacy. In Japan for example, privacy is seen as a western imported value and there is no corresponding word in Japanese to privacy (Orito, and Murata, 2005).

Therefore as mentioned before privacy can be related to culture itself, or it can mean that different societies can provide different or less favourable cultural or political conditions for implementation (Collste, 2008). In other words it can mean that a value is valid in one society but not in another. This assumption emphasises the need to conduct such research in the Egyptian society to understand differences in people's reactions towards the acceptance of eHealth services. Research in the context of eHealth acceptance specifically, has not been addressed yet in Egypt, which could be due to the country being a developing country. As mentioned before, Egypt has started its E-government deployment in the last decade and this places the eHealth initiative to follow. Egypt as part of the Middle East which mostly share the same culture and mother tongue, makes it possible for results to be generalized but with caution and consideration of differences in Internet penetration rates.

Despite privacy concerns, the use of the Internet has empowered consumers because of its convenience, more choice of products and services, large amounts of information, and the saving of time (Liu et al., 2004). Many users benefit from the online information gathered about them. When privacy is discussed abstractly, concerns about surveillance and personal identity theft are among the most outstanding issues (Dourish and Palen, 2003). Furthermore, health information privacy (HIP) and security have been reported to be important and major concerns of the public, patients and providers (Perera 2010), which is why this research considers attitudes to online privacy as one of the factors that might affect eHealth technology acceptance in Egypt.

Many advantages and benefits have accompanied the use of computer technology in the medical field yet these benefits were also accompanied by risks (Duquenoy et al., 2008). The risks and benefits perceived by people differ across contexts of study, for example privacy perceptions are linked to cultural norms and values. How privacy claims are interpreted and applied in different societies depends on cultural expectations, history, accepted practices, existing law, and other factors.

Collste, (2008) mentioned that people are more keen and careful to reserve their privacy in the Western community unlike in the Asian community where people usually

feel that it is comforting to get into each other's lives and share information about each other, which builds social relationships. Egypt has the same case too, where social relationships are important especially those between families. Value differences between the West and the East have been emphasised, which makes it important for privacy to be studied from the point of view of both contexts. Privacy if studied within the Western context without relevance to the Asian and Middle-Eastern context may bring problems for global Internet services. In this research, privacy is studied in the Egyptian context, which hence share similar values as the Middle East. Interesting relationships deduced from the results have been found where it was anticipated that due to the Egyptian culture, the value of privacy might be reduced due to the benefits obtained from eHealth when it is in place. However, interestingly privacy concerns were found to have a negative relationship with eHealth acceptance, which is similar to those found from literature in the West. Acceptance of eHealth in particular as that of other technologies has many factors that influences it.

Second, in order to gain and in-depth understanding of technology acceptance and to propose a model for eHealth acceptance there was a need to study other factors pertaining to widely used technology acceptance models. This is due to the considerable demand for health-related information worldwide, and the Internet is gaining ground as a central source of such information (Andreason et al., 2007). Factors such as perceived usefulness, ease of use, and behavioural (pertaining to the UTAUT model) needed to be adapted to the level of eHealth awareness in Egypt. And they were found to be directly correlated with eHealth acceptance.

Third, health services in Egypt are not only restricted to the public sector but also to the private sector. A person is not restricted to either form of health are provision and it is left to his/her preference were he/she might use either or form or even both. This aspect has been particularly reflected in the questionnaire in questions testing the behavioural intention of users to accept eHealth.

Fourth, the social influence construct in this research which means the extent to which an important other *person* might affect a user's eHealth acceptance was also adopted to the Egyptian culture and level of eHealth awareness in Egypt. Since eHealth is new in Egypt, therefore it cannot be assumed that there are important others that have been using a form of an eHealth service who might influence another user's acceptance. For this reason, social influence exerted (in this case where the concept is new to Egypt) had to be from the doctor's side. Since social influence can be from any important other such as family member, colleague, teacher or even doctor, therefore the only social influence in this research that can be tested is that exerted form one's doctor, due to the

reason that citizens haven't been exposed to the service officially yet and therefore they can't influence each other behavioural intention to accept the technology (details in chapter 5 section 5.1).

The literature suggests that it is clear that some users desire a range of services to be brought online by their own health care provider. What is less clear is whether the services offered by health care providers are services that users (patients) desire. Inconsistencies between the two positions could hinder users' acceptance and use of the technology (Beekens, 2011). The fact that technological acceptance factors need to be tested in cultures is important to determine such desires by Internet users. The aim of this research was to investigate what users really want and what they can accept according to various perceptions towards the eHealth acceptance factors. These factors include perceived usefulness of the technology, its ease of use, and privacy factors such as general privacy attitudes of users towards online transactions as well as online trust factors.

In summary concerns may create barriers for people to engage in eHealth transactions because of the fear of others invading their privacy (e.g. their data being used for unwanted purposes) as mentioned previously. This has been noted by various researchers in this context as highlighted earlier as well as from the results of this study. However, other factors affecting acceptance for example the usefulness and ease of use of eHealth technology were found to be positively related with (and impact) the acceptance of eHealth.

1.3 Problem Statement

Technology increasingly intervenes in many processes that are part of the understanding and the provision of healthcare, which has placed a high degree of focus on patient identity in eHealth. eHealth requires the exchange of health information online, which might put the patent at risk due to the sensitiveness of health information. Patient identity and health information might be misused or stolen by third parties. Such misuse may affect the patients' dignity, reputation, insurance plans, loan approvals and even employment status, example: in cases with HIV and AIDS.

This research focuses on factors affecting eHealth technology acceptance of general Internet users that can be defined as anyone using the Internet for health information and/or any other online activity. The research has adopted and tested a well-known technology acceptance model. However, the main technology acceptance factors pertaining to the UTAUT are not enough to measure acceptance of eHealth technology

since it was originally designed for business settings. Therefore, this research further adds other factors to the original UTAUT ones to clearly test acceptance in the eHealth domain. One of the main factors addressed in this research is privacy attitudes towards online transactions, which was found to inversely affect the acceptance of eHealth. Therefore, privacy attitudes need to be accounted for by eHealth designers and providers in order to ensure the acceptance of eHealth and to prevent waste in expenditures on eHealth projects that may come to failure due to the fear of patient identity misuse or theft. Users' privacy could be threatened when engaging in eHealth as mentioned earlier and such invasion of privacy and disclosure of unauthorised information can have adverse impacts on eHealth customers' careers and life generally.

Information and Communication Technology (ICT) mediates between the practitioner and the patient, and may have considerable influence on organisational practice (Duquenoy and Whitehouse, 2008). eHealth research has focused on a variety of online functions that include: content quality, privacy/confidentiality protection, e-mail communication with a physician, e-therapy, fixed versus user-driven web sites, and characteristics affecting users' use of the Internet (Bodkin and Miaoulis, 2007).

The growth of the Internet has been accompanied by the growth of eHealth services such as online medical advice and online pharmacies. The increase of services and the increasing regulatory and legal requirements for personal privacy have triggered the need to protect the personal privacy of service users (Yee et al., 2006). This provides a good business case for improving privacy, any online site needs users and so it is just as important to non-commercial enterprises. eHealth can be commercial (as in Internet pharmacies), or non-commercial (for example a health information site).

Furthermore, technology evolution allows patients and providers to obtain follow up test results, ask questions, schedule appointments, renew prescriptions and send reminders. Such communication has been tested through surveys, which resulted in 67% of adults living in the U.S. use a computer with 51 % use at home, 49% at work and 26% at colleges and libraries (Hassol et al., 2004). Some of these surveys showed that patients and providers are very pleased with such electronic messaging because it saves time, easy to use and better than calling their providers on the phone. However, there are also disadvantages despite the advantages. Disadvantages are that it is missing the audio/visual cues of in-person contact and interactivity of real time communication. Threat towards losing patient privacy and confidentiality as a result of electronically transferred information might negatively affect eHealth acceptance by also negatively affecting the performance expectancy of eHealth (perceived usefulness).

Although most healthcare organizations have policies and procedures to guarantee at least minimum levels of privacy protection, they are not core features of most

technology systems in the healthcare industry. This is true despite the fact that unauthorized disclosure of an individual's private health information can affect one's career, insurance status and even reputation in the community (Fung & Paynter, 2006).

There are limited data in literature on the use of electronic communication and its acceptance in healthcare from the user's side. Mostly the literature consists of guidelines for the use of e-communication, surveys on attitudes about e-communication, and patients' experiences and attitudes about having access to their electronic records (Hassol et al., 2004).
The limitation experienced in literature posed a challenge to undertake this research, which aimed to understand the factors that affect Internet user's acceptance of eHealth technology.

The implications of eHealth and research in general therefore pose a need to discover and understand the existing factors that affect technology acceptance in the "e-world". These are usually components of technology acceptance models, and are studied in this research. On the other hand, there is also a need to study and understand other factors: Internet user's attitudes towards online privacy, online trust and Internet experience and exposure, which also affect acceptance since eHealth is an Internet activity. To conclude, eHealth lies in between the Internet and healthcare. Neither operates under clear privacy rules. This placed importance on undertaking this research.

1.4 Research Scope

Technology, regardless of how promising or technical superior it can be, is ineffective if not used. Sine the 1980s, significant psychological research was undertaken on the formation process of behavioural intention, which eventually leads to human behaviour (Ajzen, 1985). Davis (1986) proposed his Technology Acceptance Model (TAM) in order to explain the use of technology in business settings. Current reviews of the literature, however, suggest that the TAM (Davis, 1986, 1993) is not sufficient to correctly assess the acceptance and adoption of health care areas using ICT (eHealth) (Holden and Karsh, 2010). The main reason for this is that these models have been rarely tested in health care environments; however attempts were made but mainly focused on the technology acceptance and use by health care professionals.

It is necessary to put a distinction between two different end-users of technology in health care settings: the professional and the patient. To research date, technology acceptance research in health care settings has largely ignored the patient which has

also been emphasized by researchers (Wilson and Lankton, 2004; 2006; Holden and Karsh, 2009, 2010; Beekens, 2011). This is unfortunate, because the factors as perceived to affect the technology acceptance of the patient may well be differently perceived from professionals because the patient is the party 'on the receiving end' and the one who is providing his personal information, therefore different considerations when talking about technology acceptance are needed such as privacy attitudes. This research therefore focuses on Internet users (patient side), leading to the following research question:

How do privacy attitudes and other technology acceptance factors affect the acceptance of eHealth in Egypt?

Since eHealth shares many similarities with e-business, it could be assumed that the need for trust and the concern for privacy are at least similar and at most crucial because information exchanged is highly personal, and health is likely to matter more to people than commercial activities. Furthermore, the extensive use of the Internet in most day-to-day transactions has brought its use for health matters too. Corbitt et al., (2003) stated that, recognized efforts have been made to examine the trust, privacy and security and site attributes in e-commerce participation and adoption.

Arguably, users engaging in online eHealth transactions are worried about the privacy of their personal data – such as credit cards, personal information, and health records. These concerns may create barriers for people to engage in eHealth transactions because of the fear of others invading their privacy (e.g. data used for unwanted purposes). The reason for the sensitivity of such information is the possibility for its access by employers, bankers, insures, credit card companies and government agencies for making decisions about hiring, firing, loan approval and for developing consumer marketing (Fung & Paynter, 2006).

The scope of this research evolves around the factors affecting technology acceptance of eHealth. These factors include both technology acceptance factors adopted from the UTAUT and added factors by this research and how they affects the acceptance and uptake of eHealth activities. Relating these issues through using appropriate research methods and data analysis leads to an understanding of the impact of user online privacy on the acceptance of eHealth activities particularly in Egypt, as the vehicle of this research study.
Specifically this research evolves around the technology acceptance factors widely used in the literature as well as adding privacy, trust, Internet experience and

satisfaction with medical care as factors that have been found to affect the acceptance of eHealth technologies.

An eHealth initiative has not been carried out yet in Egypt and limited research was found on eHealth acceptance from the user's (patient side) that accounts for privacy, trust and technology acceptance factors together. From the point of view of this research there is a need to understand if people will accept the technology by first understating their privacy attitudes towards general online transactions as well as understanding their awareness of health technologies, which in turn helps to understand their degree of acceptance predicted from technology acceptance factors. The section below describes the research aims and objectives followed by Figure 1.3 that outlines the overall research process that was adopted to reach the aim and objectives of the thesis (more detail is given in Chapter 3, Research Methodology).

1.5 Research Aims and Objectives

The overall research aims and objectives of the thesis are as follows:

The aims of this research are:

- Discover the factors that affect the acceptance of eHealth technologies in Egypt through testing the UTAUT.
- Understand the impact of added factors: general attitudes to online privacy, online trust, Internet experience and satisfaction with medical on the acceptance and uptake of eHealth services.
- To develop an enhanced eHealth technology acceptance model taking into consideration the added factors (extension of the UTAUT).

The objectives are:

1. To understand privacy measures (standards & policies) and risk issues related to eHealth from the current literature. Hence, to identify user barriers to using eHealth services.
2. To investigate and understand privacy concerns and attitudes to the Internet and eHealth activities using first the literature and second by conducting a survey study on a random sample of Internet users in Egypt after undergoing a planned pilot study.
3. To investigate current available technology acceptance models, in addition to the added privacy, trust and Internet experience constructs that will be used as a starting point for the eHealth initiative in Egypt.

4. To formulate a relationship between all the technology acceptance factors through testing of the thesis established hypotheses. In summary arriving at a proposal for a privacy-trust-extension technology acceptance model for eHealth (in Egypt) and provide recommendations to the eHealth sector on the various factors that affect technology acceptance.

The activities needed to achieve the above objectives are shown in table 1.1 below.

Table 1.1 Activities needed to achieve objectives

Activities to achieve objective 1	• Identify different e-privacy protection standards and policies using the literature. • Identifying the existing extent of user's engagement in eHealth from the literature. • Identifying exiting risk factors accompanied with the disclosure of personal information and health information. • Identifying user barriers to using eHealth services.
Activities to achieve objective 2	• Investigate existing users' attitudes to e-privacy to eHealth from existing survey results from the literature. • Design a survey study to test the acceptance of eHealth using the UTAUT constructs and the added constructs directed to a sample of randomly selected Internet users. • Carry out a pilot study for the designed survey study. • Modify survey design using the feedback from pilot study. • Carry out the modified survey study on the study sample. • Design Interviews with government officials and hospital managers to get feedback about several technology acceptance factors as a base for the research background and survey design. • Carry out the designed interviews.
Activities needed to achieve objective 3	• Search and study technology acceptance models in eHealth and business domain with their underlying factors. • Identify major components of the model from research. • Relate findings from the study of user's perceptions and awareness of e-privacy in general e-commerce transactions and in eHealth transactions to find possible correlations and comparisons among samples from the literature.
Activities needed to achieve objective 4	• Organize, summarize and analyse the results obtained from objectives 1, 2 and 3. • Establish the hypotheses. • Test the hypotheses using SPSS. • Formulate and recommend a technology acceptance enhanced model with privacy and trust factors for the Health initiative in Egypt.

Research Positioning and Relevance

- **Chapter 1-Introduction**
  - Introducing the research
  - Privacy concerns
  - Privacy definitions
  - Problem statement and research scope
  - Research aims and objectives
  - Conrtibution to knowledge
  - Thesis structure outline
- **Chapter 2 -Literature Review**
  - Impact of Technological Changes and the Internet on Healthcare
  - Health care privacy
  - Technology acceptance factors in eHealth
  - Privacy measures
  - Risks of privacy invasion

Research Process and Content

- **Chapter 3 – Research Methodology**
  - Present the knowledge claim selected.
  - Identify the research strategy adopted.
  - Explain the methods followed for data collection, analysis, and validation.
  - Research design
  - Pilot study
  - Qualitative research methods
  - Quantitative research methods
  - Research validation and triangulation
- **Chapter 4 – Technology Acceptance Models and Underlying Theories of Behaviour**
  - Introduction
  - Technology acceptance models
  - Underlying behavioural theories
- **Chapter 5 –Resserach Conceptual Model Constructs**
  - Introduction
  - Research model constructs and proposed research model

Research Outcomes

- **Chapter 6 – Data Analysis and Results**
  - Data gathering.
  - Pilot Study
  - Quantitative and qualitative data analysis and results.
  - Partial models and model fit.
- **Chapter 7 – Discussion**
  - Discussion of results.
  - Overall model fit
- **Chapter 8 - Summary, Contributions, Future Research and Conclusions**

1.6 Contribution to Knowledge

- The challenges for eHealth and determinations of factors that affect eHealth technology acceptance in Egypt.
- An in-depth study of the privacy attitudes of the target sample in Egypt (Internet users).
- An assessment of the impact of attitudes towards online privacy in the context of eHealth in Egypt.
- Insights into cultural differences regarding technology acceptance factors eHealth.
- An extension and enhancement of the UTAUT model by including online privacy, online trust and Internet experience and exposure factors.
- Recommendations relevant to eHealth providers in Egypt.

1.7 Thesis Structure Outline

Chapter 1 “Introduction” begins by setting the relevance of the research in this area. It then gives a brief overview of privacy (including definitions) and how it relates to eHealth, where eHealth lies in between the Internet and Healthcare. It then describes privacy concerns and their growth with greater Internet usage, and goes on to outline the research scope (including aims and objectives). Finally, the conclusion will summarise the main points of this chapter and end with (i) the structure of the thesis, and (ii) the contribution to knowledge.

Chapter 2 “Literature Review” discusses the available literature on a) Attitudes and users’ perceptions when engaging in e-services in general; b) Attitudes and perceptions of users when engaging in eHealth; c) Existing privacy and security measures as well as privacy enhancing technologies; d) E-Business related concepts: Confidentiality of data; e) Privacy techniques and policies; f) eHealth generally and Electronic health records (use, management and security); g) and privacy risks with their types like privacy and security risks available. These include network privacy risks, server side risks, client-side privacy risks, and a diagnostic of privacy controls.

Chapter 3 “Research Methodology” describes the methodological approach adopted for this research as well as the methods used for data gathering. It also describes the pilot study conducted as well as the analysis procedures and research process framework. In addition the chapter describes the research conceptual model.

Chapter 4 “Theories, Technology Acceptance Models and Factors related to eHealth Acceptance”, discusses the existing technology acceptance models, e-commerce models, e-privacy and trust models as well us underlying theories of these models which are available from the literature. In addition the chapter also discusses their characteristics, usage, advantages and limitations.

Chapter 5 “The Proposed Research Model (UTAUT extension)” discusses the constructs used in Questionnaire design.

Chapter 6 “Data Analysis and Results”, provides a description of empirical data findings and analysis of data collected from questionnaires and the results obtained from interviews are explained. The chapter shows how the analysed results are linked to the research question by testing the research hypotheses.

Chapter 7 “Discussion”, provides a discussion of the empirical findings and interpretation of results.

Chapter 8 “Summary, Contributions, Future Research and Conclusions” Summarizes the research, shows how the implications of the findings affect the acceptance and uptake of eHealth as well as discusses implications and contributions to knowledge. The chapter also discusses future works, strengths and limitations.

1.8 Summary

The use of the Internet in healthcare involves confidential information being developed and implemented electronically. Applications such as e-mail, online conversations and discussion lists are available for caregivers and patients to communicate through. Patient databases are stored on the Internet, with some providers storing complete patient records in Internet accessible sites. Patients can also interact with databases to receive tailored health information. The availability and exchange of health information on the Internet known as eHealth, raises privacy issues (Fung & Paynter, 2006).

In eHealth, access to data is a complex issue. It is currently technically possible to establish systems that allow different levels of access to an individual’s electronic health records. However, it is not clear what a sensible access policy would be employed because there is an unresolved conflict between privacy and sharing healthcare data for both individual and public benefit (Royal Society, 2006).

Moving with the trend and the debate on e-privacy in eHealth inferred from the literature review conducted, the contribution of this research is the provision of an enhanced

eHealth technology acceptance model with privacy, trust and Internet experience factors. Another contribution is recommendations regarding the factors that affect the acceptance of Ehealth in Egypt which bridges the gap found in the context of eHealth acceptance form the use's side. These recommendations are for eHealth service designer and providers.

The next chapter presents the background and rationale for this thesis through the review of existing literature related to Internet use. A comprehensive review was conducted by accessing published reports from online databases, e-books and hardcopy sources. In addition, reports and reliable online statistics found on the Internet public search engines were accessed. Additional resources were taken from citations provided in article reference lists. Emphasis was placed on recent articles in order to highlight the most current information and methodological techniques being employed in this area of research. Very limited studies are available in the area of privacy concerns related to Internet use and eHealth acceptance from the patient side.

Chapter 2 - Literature Review

This chapter discusses the available literature on a) Attitudes of users when engaging in e-services in general; b) Attitudes of users when engaging in eHealth; c) Existing privacy and security measure as well as privacy enhancing technologies; d) e-Business related concepts; e) Confidentiality of data; f) Privacy techniques and policies; g) eHealth generally and electronic health records (use, management and security; h) and privacy risks with their types like privacy and security risks available. These include network privacy risks, server side risks, client-side privacy risks, and a diagnostic of privacy controls. It will start with an introduction to e-privacy; the Internet and health care; health information defined; Impact of technology and the Internet on health care; technology acceptance in IT and eHealth; importance of privacy in eHealth; user attitudes and the practice of eHealth; privacy measures and privacy enhancing technologies; managing eHealth privacy in organizations; and ends with a summary of the chapter.

2.1 Introduction to e-Privacy

'A person has privacy when two factors are in place; first an ability to control information about oneself, and second, be able to exercise that control consistent with oneself values'. (Senicˇar et al., 2003).

Human-Computer Interaction (HCI) researchers have long acknowledged the implications their designs have for personal privacy. The interaction between technologists and social scientists in HCI, and the related computer-supported cooperative work (CSCW) community, has led to mutual appreciation of the interdependent relationship between technology and situations of its use. This, in turn, has heightened awareness of the privacy concerns that novel technologies introduce (Dourish and Palen, 2003). Information quantity is variable among different types of systems, and the sensitivity of information may vary from individual to individual and from context to context. Although researchers have recognised the existence of privacy concerns in a wide variety of technological domains, designing effective solutions to address these concerns remains challenging (Patil et al., 2006). Few empirical studies have been conducted with the main aim of studying privacy issues (ibid), *which places a challenging opportunity to uncover the gap in this research area and has been the motivation for this research.* The primary challenge is that the user does not always know who is gathering information and what is being done with the data. Most people

are not aware that this information, like some public records, could be available online to whoever is interested (Ackerman et al., 1999).

As a *dynamic* process, privacy is understood to be under continuous negotiation, management and research. The *boundary* that distinguishes privacy and publicity is refined according to circumstances and context. Information privacy is usually concerned with the confidentiality of personal identifiable information (PII) and, with regard to medical information, protected health information (PHI) such as electronic medical records (EMR). PII and PHI data can be protected by applying access control technology, however there is a need for privacy concepts to be incorporated such as purpose and obligation (Hung, 2005).

Ackerman et al., (1999) conducted a series of survey questions designed to provide insights into Internet users' attitudes towards privacy. They looked for reasons behind user's sensitivity through open-ended questions and standard survey questions. Another issue of their interest was to know how people responded to situations where personal information is collected.

2. 2 The Internet and Healthcare - Health Information Defined

Healthcare is a service industry that relies on information for every aspect of its delivery. Health information is important to the patients, the medical information is important to practitioners, institutions, healthcare professionals, and the society as it directs the health of the population (Fung & Paynter, 2006). Medical care can be a costly expense as a service industry for any country. In the United States, total healthcare costs are $2.2 trillion per year, or about 16% of GDP (Smelcer et. al., 2009). This equates to a per capita cost of $7,421 yearly (ibid). In contrast, most industrialized countries spend less than half that amount, typically less than $3,000 per person per year. The nationalized medical system in the United Kingdom spends about $2,317 per person per year (ibid). According to the World health Organization (WHO) in Egypt the total expenditure on health per capita in (Intl $, 2010) was $289, which is unfortunately a very small amount compared to that spent on per capita in developed countries.

From here also arose the importance of this research, where understanding privacy attitudes, trust and other technology acceptance factors may help patients (users) a great deal to manage their health care easily and on the other hand it would lift the burden off the "government shoulders" by means of saving costs acquired by this industry due to computerization benefits. Also, not to forget that this research serves as

a starting point for the eHealth initiative that has been in focus but rather at a slow pace, by the Ministry of Health and Population (MOHP) in Egypt that was mentioned by the government officials at the MOHP. This study on eHealth will also allow for implementation by organizations providing online health services to overcome many barriers and hurdles in the healthcare industry in Egypt.

Definition - Health information includes information for staying well, the preventing and managing disease and making other decisions related to health and healthcare. It includes information for making decisions about health products and health services. Health information may be in the form of data, text, audio, and/or video and it may involve enhancements through programming and interactivity (eHealth code, 2010). The Eastern Mediterranean Regional Office (EMRO)'s a subsidiary of the (World Health Organization) WHO defined eHealth as 'the use, in the health sector, of digital data transmitted, stored and retrieved electronically for clinical, educational and administrative purposes, both at the local site and at a distance' (Al-Shorbaji, 2006).

In addition, the American Health Information Management Association (AHIMA) defines health information as (Fung & Paynter, 2006):

- 'Clinical data captured during the diagnosis and treatment.
- Demographic data used to identify and communicate with and about an individual.
- Research data gathered as a part of care and used for research or gathered for specific research purposes in clinical trials.
- Coded data that is translated into a standard nomenclature or classification so that it maybe aggregated analysed and compared'.

The Internet has offered its users different ways to acquire health information. Health is relevant to all individuals regardless of their background. Many claim that millions of individuals across various age groups are keen to seek health information through the Internet. Canadian statistics in 2001 reported that only 46 percent of Canadians used the Internet to access health information, and these numbers were substantially lower than the reported 75 percent who access information related to goods and services and 65 percent who accessed the Internet to read news online (Johnson, 2008).

A recent survey of 440 health care organizations found that more than 80% now deliver some form of eHealth to their patients, and more than 50% implement advanced eHealth applications, including online formularies, prescription refills, test results, and physician–patient communication (Egea and González 2011).

In 2010, health care accounted for 16.2% ($2.6 trillion) worldwide (Egea and González, 2011). Due to the health industry's massive size, decisions by health care organizations

to implement eHealth are likely to have serious economic consequences and social consequences as patients adapt their lifestyles to interact with providers online rather than via telephone or office visits (ibid).

Professionals, policy makers, and customers claim that the Internet has great promise for the future of healthcare delivery in light of the present healthcare climate of government and/or organization budgetary constraints (ibid). These promising benefits are requiring the elimination and restructuring of existing programs and services as well as difficulties in providing health information and services to underserved populations such as those with disabilities and those in remote and rural areas exist (ibid). In addition, the Internet has been used as a health information system for physicians and other healthcare personnel for patient care and management in addition to consumers for easily accessible health information (Eysenbach, 2000). Many policy documents suggest that technology is used as a means of addressing many of the problems facing the delivery of healthcare services to individuals (Hermanova & Richardson, 2001).

Moreover, differential levels of access to health information through the Internet have been shown in various studies in the United States, Japan and Europe. Generally, only 15 to 55 percent of those who access the Internet, browse for health information. Specifically, in the U.S., 55% of Internet users have used the Internet to access health information not only for themselves but also for their family and friends (Johnson, 2008).

In the health domain, barriers that prevent individuals from accessing health information through the Internet have not been examined, although different demographic factors have been shown to influence the level of Internet use (Wilkowska and Ziefle, 2012). In the marketing arena, Internet privacy and security concerns were attributed as barriers to online transactions that are considered for purchasing products or services. These factors might also be of concern when accessing eHealth information. However, very little systematic research is available in examining Internet privacy and security concerns and the relationship to online behavior in e-Commerce and eHealth (Johnson, 2008).

Privacy is a necessary concern in electronic commerce since it is almost impossible to complete a transaction without revealing some personal data. Users may be unwilling to provide the necessary information or even to browse online if they believe their privacy is invaded or threatened (Ackerman et al., 1999). Goldman and Hudson, (2000) stated that consumer focused Internet services, are services targeted to consumers who are accessing information and services. Traditional healthcare activities are migrating to the Internet, such as recruitment for clinical trials, fulfilment of prescription drugs, applications for health insurance, and even consultations with medical care providers.

As healthcare continues to evolve to a more patient centred approach, patient expectations and demands will be a major force in driving the use of electronic communication in healthcare. Many patients are interested in using e-mail to communicate with their physicians and are interested in receiving online health information from their doctor's office (Hassol et al., 2004).

2.3 Impact of Technology and the Internet on Healthcare (eHealth)

eHealth is a term used by many academic institutions and professional bodies. It has rapidly emerged and became a *buzzword* since 1999. In short, anything related to computers and medicine is characterized as eHealth. It can include a wide range of technologies like internet, interactive television, personal digital assistants, CDs and ubiquitous computing, a range of health services and information types like family practitioners' surgeries, public settings, consultations and decision making as well as a range of different parties like medical professionals, technology providers, patients and carers (Sillence et al., 2008).

The future success of eHealth is likely to depend on how ordinary citizens can access their health and obtain health related information over the web in a secure manner (Chowdhury & Ray, 2007). Recent developments in eHealth services will only deepen the conflict between individual privacy concerns and the pressure for health informatics from non-medical institutions (e.g., insurance companies) unless a security and privacy policy framework is developed (Hung, 2005).

Figure 2.1 below illustrates an eHealth database application example. Three entities are involved: Web Services Application, Web Service, and eHealth care Database. The Web services application can be any healthcare application at a health institute that is connected to a Web services at another health institute over the Internet. Web service is used as an interface to receive the request of healthcare data from the application and then communicate with the eHealth care database at the backend and returns a result e.g., read and write health data to the application (Hung, 2005).

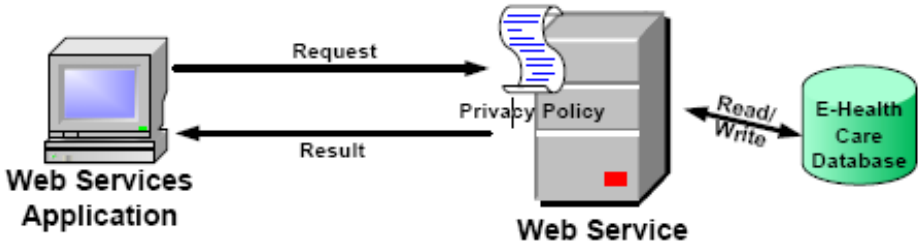


Figure 2.1 An Illustrative eHealth Database Application (Hung, 2005)

Such use of the Internet involves confidential health information being developed and implemented electronically. There are already several applications available on the Internet for caregivers and patients to communicate and for electronic storage of patient data. Such include e-mail, chatting, information retrieval, and bulletin boards. Some caregivers and patients use e-mail and chatting to communicate (Fung & Paynter, 2006). Internet privacy and security issues are publicised by various governments, industries and organizations. The use of existing and new technologies has been in focus to facilitate advances in medical imaging and medical informatics (MIMI). Such focus is often directed to the technical capabilities and possibilities that these technologies bring. Despite the fact that new technologies act as a mediating agent and offer the potential of better healthcare, they change the dynamics and context of information delivery slightly where core ethical principles, such as patient confidentiality and informed consent, may no longer be appropriate in a new technological context (Duquenoy et al., 2008). However, users themselves expressed their concerns through responses as evidence through a number of popular and market surveys (Johnson, 2008) along with a limited number of empirical studies reported in Chapter 1 and highlighted several times in this Chapter.

Good communication between patients and providers is essential for high-quality healthcare. Patients and providers have traditionally communicated in-person, through telephones, or paper-based methods. The evolution of technology now allows patients and providers to communicate electronically to obtain follow-up of test results, ask questions, collect information before a visit, schedule appointments, send reminders, and renew prescriptions (Hassol et al., 2004). (Fung and Paynter, 2006) emphasized that secured electronic communication services help patients become active participants in the healthcare process where patients can search for healthcare information over the Internet and interact with physicians. Researchers suggest that by putting the patient at the centre of diagnosis/treatment process, communication is more open and there is more scope for feedback or complaint. This enhances and supports human rights in the delivery of healthcare.

The Internet might enable users' access to their health records, enter data or information on symptoms, and receive computer-generated suggestions for improving health and reducing risk. It could also allow emergency room physicians to identify an unconscious patient and down load the patient's medical record from a hospital across town, as well as enabling patients residing at home to consult with care providers over real time video connections (Fung & Paynter, 2006).

2.3.1 Studies on the Use of Technology In Healthcare

A Japanese study involving both the patients and physicians reported that the use of the Internet as a source of health information was higher for physicians (50%) compared to patients (22%) reported by (Johnson, 2008). A study conducted by (Perera et. al 2010) where 511 patients with (average age 60 years and 49.6% female) and 46 physicians (average age 47 years, 37.0% female) participated. The study reported that (>90%) supported the computerized sharing of the patient's health records among their healthcare professionals and to provide clinical advice. Fewer agreed that the patient's information should be shared outside of the healthcare circle (<70%). Only a minority of either group supported the notion that computerized records can be kept more private than paper records (38–50%). Overall, a majority (58% patients, 70% physicians) believed that the benefits of computerization were greater than the risks of confidentiality loss. This was especially true for patients who were frequent computer users.

Results from European survey study on elderly people, reported that respondents had interest in various eHealth applications, although this trend declined with age increase. The survey showed that the older people get, the more they depend on medical and social care (Stroetmann et al., 2002). In a Canadian study, Johnson (2008) found that younger individuals (21 percent) were more likely to access health information online, compared to elderly individuals (5.8 percent). People who were married or in a relationship (79.1 percent) used the Internet to access health information more than those who were never married, divorced, or widowed (20.9 percent) (ibid).

In several studies, patients and physicians have expressed their desire to limit medical-record access among healthcare workers in order to reduce the potential for misuse. In another study, patients were concerned about the secondary use of their health information for research purposes unless all personal identified information were removed or consent is obtained (Perera et al., 2010). However, these studies were somewhat hypothetical in that patients and physicians had limited exposure to electronic medical record practices. Studies evaluating electronic health information communication and storage systems in Europe have noted that exposure to both

electronic medical records and to the exchange of personal health information among healthcare providers through a secure electronic system increased patient confidence in such technologies. This may suggest that patients actively offset their privacy concerns with their perceived benefits from EMR and may be reassured as time passes (Perera et al., 2010).

A survey conducted in 1998 by the American college of physicians – American Society of Internal Medicine, reported that 82% of physicians were using computers where 67 % of the physicians who had an Internet connection used it on weekly basis, 2.6 % used it to communicate with patients in addition to another survey reported that 25 % were using the internet to communicate with their patients (Hassol et al., 2004). In a survey by Harris interactive (2002), 93 % of physicians reported using the internet with 87% accessing it at home, 56% in offices and 40% in clinical working area. Another U.S. study of family practice found that patients older than 65 years of age were less likely to access information through the Internet, even after adjusting the presence of a home computer and Internet access (Smith-Barbaro et al., 2001). Among the 50 to 59 age group, 52 percent had used the Internet to access health information, compared to only 15 percent among those over 80 years of age (ibid). (Johnson, 2008) also stated that women with more health needs or concerns are more likely to use the Internet as a health information source. Also, A study of seven countries on European citizen's use of eHealth services reported that women used more health related data on the Internet (Andreason et al., 2007). However, there are limited population-based studies to obtain a more precise profile of Internet use and access to health information among various age groups, including the elderly.

Antón et al., (2009) conducted two surveys one in 2002 and the other in 2009; they wanted to know the evolution of Internet users' privacy concerns since 2002. Both surveys had the same objectives. They found that information transfer, notice/awareness, and information storage were the top online privacy concerns of Internet users for the survey in 2002. However, they reported that since 2002 there have been many privacy-related events, including changes in online trends and the creation of law which were the trigger to rerun the survey in 2008 to examine how these events may have affected Internet users' online privacy concerns. The results of the recent survey showed an increase in the concern regarding information transfer, decreased concern about notice /awareness and increased concern of the third factor (concern) information storage.

Moreover, A survey conducted by (Ackerman et al., 1999) demonstrates that a majority of respondents were always or usually comfortable when providing information about their own preferences including favourite TV show (82%), favourite snack (80%), 76%

said they were always or usually comfortable when they provided their e-mail address and 69% when they provided their age and 63 % when they provided information about their PC. About 54% said they were always or usually comfortable when they had to provide their full name or postal address (44%). A few were always or usually comfortable when they had to provide information about their health (18%) only, income (17%), or phone number (11%). Finally, none of the respondents were comfortable when providing their credit card number (3%) or social security number (1%).

(Sabel, 2005) suggests that individuals within the 30 to 50 year of age are most likely to buy online and least likely to express Internet privacy and security concerns compared with other age groups. However, (Ellison et al., 2001) reported that young adults (less than 30 years of age) are most likely to buy online and least likely to express Internet privacy and security concerns. In a US Department of Commerce 1999 study, those individuals with a high school expressed the highest concern whereas (O'Neil, 2001) showed that lowest level of concerns were expressed by those with a high school level education. The inconsistencies in the findings might be due to differences in the methodologies adopted or differences in cultures.

From this point arises the necessity of using a mixed method i.e. both quantitative and qualitative methods to properly understand the contextual background regarding eHealth in Egypt through Interviews and to understand te factors that the acceptance of eHealth in Egypt using questionnaires.

There are limited data on HIP concerns of patients and physicians in American electronic healthcare settings. Studies have shown that few patients expressed concerns when their paper health records were transferred to electronic medical records for research and a few patients that were part of electronic medical record practices in north-central Pennsylvania expressed general concerns regarding security and confidentiality of their online medical information (Perera et al. 2010). Despite such findings, the current clinical and research environment requires a more specific investigation of patients' and physicians' opinions (ibid), which is what explored in this study

2. 4 Importance of Privacy in eHealth/Privacy Risks and Invasion

eHealth has become a valued tool in both private and public healthcare due to its promise of efficiency and cost-effectiveness. However, the Internet has been recognized from the very beginning as presenting a variety of problems that range from

privacy and security issues to reliability, quality control, accessibility and usability (Kluge, 2006). An example where information must be protected is medical privacy (Senicˇar et. al., 2003).

Four ways for privacy protection to be achieved is by (ibid):

1. Protection by government laws.
2. Protection by privacy-enhancing technologies
3. Self-regulation for fair information practise by codes of conduct promoted by businesses;
4. Privacy education of consumers and IT professionals.

2.4.1 Risks of Privacy Invasion

The misuse of information without the owner's specific consent or knowledge is the main threat for the user in the health sector. (Chowdhury and Ray, 2007) stated that risks could be identified as: a) Non-compliance with the industry best practices from the information owner and information receiver, b) Deviation in service quality standard on e-service issues implies that proper privacy policies should be there in compliance with the legislation, ethics and standards, c) and finally, privacy clauses in technically written privacy policy may not be understood by the user. Information privacy is usually concerned with the confidentiality of personal identifiable information (PII) and protected health information (PHI) such as electronic medical records (Hung, 2005). Security issues have to be studied and tackled seriously in eHealth services due to the systemic use of protected health information (PHI), which poses additional potential threats to the security, privacy, and confidentiality of e-patient information. A published survey reported that in the U.S., some people do not file insurance claims or seek health services through providers due to the fear that disclosure of their health information may negatively affect their job recruitment or ability to obtain insurance coverage (ibid).

Although technology advances improve the features, functions and capabilities of electronic medical record (EMR) systems, they increase the number of parties that can have unauthorized access to medical information such as hospitals, insurance companies, marketing agencies, pharmaceutical companies, and employers (Fung & Paynter, 2006). However, the use of electronic medical records (EMRs) as the primary source of patient medical information is still relatively rare, but increasing in Canadian, British, American and Australian primary care. The same perceived benefits of electronic medical record databases are also sources of health information privacy concerns (Perera et. al. 2010).

Accidents due to lack of security that violated information privacy were reported. These accidents included a major hospital in Seattle, Washington, where USA confirmed that during the summer of year 2001 a hacker penetrated its computer network and stole files containing information on 5000 patients. Another accident was reported where an official at the University of Washington Medical Center said that someone stole users' passwords and copied thousands of files. The hacker gained access to the hospital's network through an exposed Linux server in the hospital by using sniffer software to steal the electronic identifications of a number of hospital employees from the exposed server and then used the credentials to access files related to patients (Palmer and Meyer, 2001).

Healthcare organizations must manage large amounts of healthcare information including clinical test results, financial data, and patient tracking information. Although most healthcare organizations have policies and procedures to ensure the minimum level of privacy protection, these are not core features in the technology systems in the healthcare industry. The application of information technology to healthcare, especially the developments of electronic medical records and the linking of clinical databases resulted in growing concerns regarding the privacy and security of health information (Fung and Paytner, 2006).

Many developed countries like the UK, U.S., Australia and the Netherlands are taking eHealth very seriously and are assigning large budgets for the sake of improving the quality of healthcare services. According to this, there is a need for a more flexible way for users to specify their privacy preferences rather than simply accepting or rejecting a fixed set of policies stated by the service provider. In eHealth patients should be allowed to control aspects like "which parts of their personal data will be disclosed, to whom the data will be disclosed, and for what purposes the data will be disclosed" (Hong et. al., 2008). For example (Goldman & Hudson 2000) stated that the US is facing a controversial debate over how and to what extent individual privacy should be protected in healthcare. Many health companies are continuing to accumulate consumer profiles in detail and such profiles include health status. Insurance information, as well as purchasing patterns being rich information sources is tempting to be used for purposes beyond those for which the information was originally gathered (ibid).

Some providers on Internet accessible sites store patient records that might include healthcare information images as well (Duquenoy et al., 2008) allowing interactivity between patients and these databases to retrieve customized health information where selection is based on personal profile, disease, or particular need such as travel or cross border heath care. Nevertheless, medical information being available in electronic form raises privacy issues (Fung and Paynter, 2006) who stated that the unauthorized

disclosure of one's private medical information can affect career, insurances status, and even reputation in the community. Chowdhury and Ray, (2007) stated that the misuse of personally identifiable information could result in vulnerability, humiliation, discrimination or economic hardship for the patient. Furthermore (Fung & Paynter, 2006) emphasized that Individuals themselves should take steps to protect their privacy against misuse of their medical information known as significant costs to their health. They also stated that the advances of Information Technology (IT) allow confidential medical records and health information such as mental illness, HIV, substance abuse, sexually transmitted disease, and genetic information to be made available to employers, bankers, insurers, credit card companies, and government agencies for making decision about hiring, firing, and loan approval. The similar need for privacy awareness emerges with the increasing use of the Internet.

The personal medical information that the patient provides could potentially reveal information leading to a loss of job or insurance coverage and other emotional or physical harm (Chowdhury & Ray, 2007). To conclude, the privacy issue in online systems has drawn increasing attention in recent years. Users may abandon an electronic service if he/she feels being requested for too much private information (Hong et al., 2008). Patient records, test results, and other critical data are frequently not available when needed, are often misplaced, and in some cases, are completely lost. Moreover, Healthcare costs are rising due to inefficiencies of paper-based processes. Regulations for patient record privacy place strict demands on healthcare providers to protect patient information while adopting and using technology for sharing with other caregivers and patients (Cisco Systems, 2005). In order for eHealth services to be successful, personal privacy must be protected (Goldberg et al., 1997).

In short, there are many reasons to be concerned about privacy and it's risks on the Internet. These range from the dislike of targeted junk e-mail to the desire for search of sensitive topics to be kept private. For example, a user may have a health condition that does not wish to share with others, and there may be a wealth of information available on the Internet left after each search attempt related to particular health condition (Senicˇar et. al., 2003).

2.4.2 Threats to Privacy

In order to understand the notion behind the research, the implementation of policy and protection of data as stated usually in legislative acts, it is necessary to look at the privacy threats related to the Internet and eHealth.

Internet privacy threats defined by (Senic˘ar et. al., 2003) are:

1. HTTP chattering - the most frequently used service on the communication networks is Web browsing enabled by the HTTP protocol. Unless an e-user takes deliberate steps to hide her personal data, she is considered to be anonymous during a web browsing session. The HTTP, relies upon the exchange of personally traceable information between the remote user and the host web server. By default IP addresses are logged by most server software and HTTP chattering indicates the operating and browsing environment, as well as the URL location the user was at before loading the current web site. Therefore, this information is automatically transmitted without explicit consent to the user and often knowledge of the browser.

2. Cookies - The core of many e-privacy incidents are cookies. The HTTP cookie "is a file mechanism that creates the opportunity for more automated interaction between a web server and a client". Cookie(s) provide the remote server with a memory of a user's identity. They may store information about an e-customer's personal ID, recent activities at a web site, credit card details, or site password information. Regardless of the fat that cookies might enhance web site interactivity they have disadvantages that pose additional threats to personal privacy.

3. e-profiling - is the process of building databases that contain the preferences, activities and characteristics of e-customers. Users' interests, browsing patterns and buying choices are stored as a profile in a database without their knowledge or consent used for advertisements or services offered at the affiliated web sites according to each user's noted preferences.

4. Embedded Software - Powerful programming languages have been developed for web-based applications, including Java, JavaScript, XML, and Active X allowing remote servers to run applications on a client's PC. These languages may be used in the commercial sector to allow an e-business to gain access to an e-customer's personal computing environment and the data held within it again without the consent of these e-customers who are totally unaware of the privacy risks posed by Internet enabled software applications.

Despite the challenges of information privacy protection other technical challenges are facing eHealth services such as: facilitating efficiency, information retrieval and availability, and cross-context interoperability. Threats to information privacy can come

from insiders and from the outsiders in each organization (Hung, 2005) furthermore, (Fung and Paynter, 2006) categorise healthcare privacy in the following threats:

2.4.2.1 Individual Misappropriation of Medical Records.

This category is the most common type of violation in health information privacy. It involves individuals who misuse medical data, often publicly disclosing sensitive information. They violate both policies of the institution that kept the records and the laws. Some examples stated by the health privacy project are (Fung and Paynter, 2006):

- A hospital clerk at Jackson memorial hospital in Miami, Florida stole the social security numbers of 16 patients named Theresa. The clerk provided the social security numbers and medical information to a friend, also named Theresa, who opened up to 200 bank and credit card accounts and bought six new cars (Fung and Paynter, 2006).

2.4.2.2 Institutional Practices: Ambiguous Harm to Identifiable Individuals.

This category involves using personal health data for marketing and other purposes. An example of this is a chemist or pharmacist selling patient prescription records to a direct mail and pharmaceutical company for tracking customers that don't refill prescriptions, then sending out a letter to encourage them to refill and consider other treatments. The threat here is the person who might access such lists (Fung and Paynter, 2006).

2.4.2.3 Institutional Practices: Unambiguous Harm to Identifiable Individuals

This category consists of institutional practices that do cause harm to identifiable individuals where serious privacy issues are raised by this category that needs consideration and reform. The insurance and employment functions in the United States has lead to serious abuse of confidential medical information.

Examples stated are:

- 206 respondents in a survey reported discrimination as a result of access to genetic information that lead to a loss of employment and insurance coverage or ineligibility of benefits.

- A survey found that 35% of Fortune 500 companies look at people's medical records before making hiring, firing and promotion decisions (Fung and Paynter, 2006).

2.5 How Do Perceptions of Privacy Affect Practice of eHealth? Does Technology Acceptance Have a Role?

'User perceptions towards potential violations of privacy has emerged as a key factor that affects technological acceptance and adoption', (Patil et. al., 2006). The Total Information Awareness (TIA) initiative proposed by the U.S. Government was abandoned before proceeding beyond the planning phase because it was unable to address privacy fears raised by citizens concerned with civil liberties satisfactorily (ibid).

The theory of reasoned action (TRA) has been extensively used as a basis for predicting behavioural intentions and or behaviours. The TRA argues that behavioural intentions are antecedent to specific behaviours of an individual. The perceptions and attitudes of an individual will influence his or her actions if the user believes that certain behaviour will be linked to certain outcome. Using the same logic, a user's perceptions and attitudes regarding privacy should influence his or her attitudes towards online transactions and therefore shape his or her behavioural intentions to participate in online activities (Liu et al., 2004).

Although several studies addressed privacy and trust in e-commerce, none have included privacy as the major antecedent of trust. Little empirical research has been done to examine the relationship among three constructs: privacy concerns, trust and behavioural intentions. However, (Liu et al., 2004) developed a theoretical model that explains how privacy influences trust and how trust influences consumer behavioural intentions for online transactions (ibid). This model will be discussed in more detail later on in the chapter.

Academics and professionals have begun to explore the opportunities and challenges of eHealth as an umbrella term for ICT's in health care. Prior research suggests that the adoption of tele-monitoring in everyday clinical practice is feasible and can substantially improve care and decrease health care utilization of patients with chronic illnesses, (Trappenburg et al., 2008). A study has been conducted on a group of Spanish patients with heart failure using an interactive eHealth system at their own homes. The eHealth group of patients visited the hospital less frequent and felt that their quality of life improved unlike the other patients who did not use the self-management service, (Domingo et al., 2011). However, certain issues need more attention to prevent misfits

between end-user and technology because the health care sector differs considerably from other business settings that have been investigated more frequently (Beekens, 2011).

Both perceptual and experiential issues were found to be associated with customer behaviour (Johnson, 2008). Attitudes towards Internet shopping influenced the perception of Internet privacy and security concerns for individuals, as did their intended purchase. By the same notion, general attitudes towards privacy during online transactions that were described by (Ackerman et al., 1999; Jensen et al., 2005; Johnson, 2008; Liao et al., 2011) generally might also influence the behavioural intention to use eHealth (acceptance of eHealth). In order to clearly understand these aspects and influences, the questionnaire wording was carefully designed taking into consideration the formal definitions of the model constructs to be tested as well as reflecting all the results that emerged from the pilot study in the questionnaire design.

(Johnson, 2008) reported that both perceptual (attitudes toward the online behaviour) and experiential (past experiences) influenced online shopping intentions and behaviour. Therefore, people with positive attitudes about Internet shopping were more likely to purchase products and services online. Also, people having positive attitudes about shopping had less concern about Internet privacy, and purchased goods and services online.

By the same notion this applies to the eHealth domain as it resides under the umbrella of E-services. Furthermore, those who usually purchase online are more accepting of the Internet privacy and security pitfalls (Johnson, 2008). However, Hoffman & Novak, (1999) showed that higher levels of Internet proficiency or skill were associated with negative perceptions regarding Internet privacy. Also, they found that risk perception rather than instituted objective safeguards play an important role in online behaviour. In this research it was hypothesized that Internet experience and exposure have a positive of eHealth acceptance and privacy concerns have a negative effect on eHealth acceptance (detail of the research hypotheses are in Chapter 5).

Research in eHealth settings is limited when it comes to technology acceptance and has been mostly focusing on the physician's side. The patient side has not been investigated in such context where technology acceptance factors are tested with added factors such as privacy, trust and Internet experience and exposure. However, perceptions and attitudes to privacy differ considerably among cultures. Western cultures as mentioned before in the previous chapter are more "*privacy valuers*", whereas on the other hand, Eastern and Asian cultures aren't big valuers of privacy. They feel it is fine when people ask about each other and are in each other's lives, they might even think a person is not friendly or rude if he/she is too closed on his personal

life. This is the case in Egypt where family attributes govern most relationships among people and hence privacy isn't valued as much in some situations. However, technology acceptance includes much more factors besides privacy. Perceived usefulness, ease of use, behavioural intentions, social influence, facilitating conditions, trust, Internet experience and exposure and many other factors have been ever researched since the 80's.

However, technology acceptance in health care settings is new to an extent and limited. This is an issue of importance, which adds to the contribution of this thesis as well as filling the gap found form limited studies on technology acceptance in eHealth taking into consideration privacy, trust, Internet experience and satisfaction with medical care particularly from the user's (patient) side in Egypt. This limitation issue will be further discussed in forthcoming sections.

While it might be assumed that consumers would seek information from eHealth web sites to improve their health, there exists a segment of the population (17 percent) that lack trust in medical professionals (Wilkins and Navarro, 2001). A user's perception of confidence in a website is affected by trust which makes trust a key predictor of user intentions to interact with a web site (McKnight et al., 2002). Thus, lack of trust deters individuals from seeking healthcare and suggests that users' perceptions of healthcare ethics need to be addressed (Bodkin & Miaoulis, 2007), which places a need to undertake this research particularly focusing on user perceptions of privacy and their willingness to seek and accept eHealth particularly in Egypt.

2.5.1 Technology Acceptance in eHealth

In order to evaluate the challenges and pitfalls of implementation of ICT in health care, the cultural environment of the health care sector also needs to be considered, which is significantly different from average business environments (Wu, Wang, & Lin, 2005).

Succi and Walter (1999) identify three key differences between physicians on the one hand and middle managers and MBA-students on the other:

- First, the large influence of sector professionals (such as doctors and nurses) on the organizational adoption of technology. Due to the health sector's professional autonomy characterized by their special power and prestige, the job performance of health care professionals is assessed by peer reviews. In addition, the health care sector is characterized by a less structured job-performance, which explains the so-called 'non-measurability' of physicians' performances compared to other

professions (Hu, Chau, & Sheng, 2002).

- Second, the organizational culture surrounding health care is characterized by higher uncertainty avoidance than other organizational settings. For example, in health care, there exists a strong preference for using only so-called 'proven technology', and reliance on a strong evidence base (Hofstede, 1984).
- Third, in health care settings multiple definitions exist of an 'end-user'. In this particular setting, an end-user may refer to sector professionals, patients and even the academic medical community (Robertson, 1989). Especially when the delivery of health care is seen as a service offered by the health care professional to the patient, the patient is as good as an end-user as the doctor using the technology or medical devices to deliver that care, the health sector should therefore not only focus on the health care professional, but also on the patient as an important end-user of health care.

Extant research shows that various managerial, economic, and organizational issues are important to run a successful eHealth service (Hofstede, 1984; Hu, et al., 2002; Beekens, 2011). However, behaviour as a component is not explored to the same extent. This might not reveal proper views and the motivations of patients to adopt or reject ICT within health care for the following reasons simply because their behavioural intention is not explored enough (Beekens, 2011).

When it comes down to implementing an innovation and maximizing the acceptance by physicians as well as patients, the first impression of physicians and patients is of critical importance with regard to both groups. This is why research into ICT-supported health care should always account for behavioural issues that form an important criterion when studying acceptance models for their usability in health care (Venkatesh & Davis, 2000). Furthermore, Wilson and Lankton (2004) studying eHealth acceptance stress on the importance of focusing on both professionals and patients with regard to behavioural issues and (Wilkowska and Ziefle, 2012) emphasized that current technology development should include users in early stages to understand the perceived advantages and disadvantages as well as addressing users' opinions in both development and public communication policy.

In order to understand and evaluate the ways in which patients in health care environments respond to new health-related technologies, scholars have developed several technology acceptance models. These technology acceptance models are specific applications of more generic behavioral change theories that treat human behavior in terms of attitudes – people's evaluation of various aspects of the social world (Olson & Maio, 2003). These models and theories will be discussed with greater detail in Chapter 4.

However, while the potential for using consumer health information technology (CHIT) to improve health care has been acknowledged, these technologies are still not always accepted by patients for a variety of reasons:

1) Poor device usability,
2) Insufficient training on how to use the technology,
3) Lack of computer skills, and
4) Low self-efficacy (Or and Karsh, 2009).

Users who reject CHITs or eHealth technologies will not benefit from them, and rejection means a loss of return on investment for health care organizations. This concern has been realized. Some evidence have shown that a considerable number of potential users do not accept CHITs which lead to failure in implementing the technology for a number of projects.

Accordingly, it is necessary to investigate and test factors that predict eHealth acceptance. Identifying factors that predict acceptance can help create acceptance for the technology, help in developing and evaluating the ability eHealth systems to meet patients' expectations, and can also increase the probability for success of technology implementation process (ibid).

Users' interest and willingness to use CHITs (acceptance) for managing their health care has become a research area of much study. However, to date no attempt has been made to understand and interpret the evidence regarding factors quantitatively predict patient CHIT acceptance (Or and Karsh, 2009) and with further including privacy, trust and Internet experience factors in addition to known technology acceptance factors which added to the motivation behind this research.

2.5.2 Categories of Users

In the health domain, education and income in most countries were considered the most important determinant of health (Wagner & Wagner, 2003). In the Internet literature, one's level of education and income were shown to be associated with Internet privacy and security concerns (Johnson, 2008). In a US Department of Commerce (1999) study, those individuals with a high school or some college level of education expressed the highest concern.

O'Neil (2001) showed that those with higher levels of education (doctoral degree) had the highest concern, with the least concern expressed by those with a high school level education. In addition, the relationship between income and Internet privacy and

security concerns was consistent with an increased concern by lower income groups (O'Neil, 2001). He also reported that those with an annual income of higher than $50,000 had lower concerns (77%) compared with those in the lower income category (84%).

Previous studies point to a relationship between demographic characteristics and attitudes to Internet privacy and security as well as with technology acceptance in general. All these studies have used a quantitative methodology, given the nature of the issue. Demographic variables are measured as discrete or continuous variables (e.g., gender groups, age ranges, education level) and thus the study of these characteristics (demographic and Internet use) lends itself to quantitative research methodology (Johnson, 2008). Furthermore, an important consideration for online privacy technologies is to distinguish among different types of personal data (Ackerman et al., 1999). Also (Bodkin & Miaoulis, 2007) conducted a study on eHealth information quality and ethics issue, which was an explanatory study of consumer perceptions and adopted surveys as their main research method. They found that while WebMD currently dominates the eHealth care market, the future for newly introduced eHealth care web sites appears promising as consumers' perceptions of eHealth care web site quality and ethical behaviors improve.

eHealth services in general or as also known as CHITs, depending on their purposes, may be used by healthy individuals seeking out health information or by ill/injured individuals for treatment and/or self-management (Or and Karsh, 2009). This research was not restricted to a specific patients/user type whether healthy or unhealthy.

Based on individual attitudes towards privacy individuals, users are categorised as:
a) Privacy fundamentalist - those who are deeply concerned about privacy rights and breaches.
b) Privacy unconcerned - those who do not care about privacy issues and those who freely provide information.
c) Privacy pragmatists- those who have a practical view on privacy. These individuals share information based on what they get in return (Johnson, 2008).

2.6 Privacy Measures/Privacy Enhancing Technologies (PETs)

The distribution of information throughout an organization with the use of intranets or even using external networks will imply more access to data among different parties. This stresses that there is need for managerial and technical measures to protect against loss, misuse, alteration, and unauthorized access. These measures may include

cross–referencing data among multiple sources, authorization, authentication to confirm identity, non-repudiation to provide proof of origin/delivery, audit mechanism to provide records for independent review, confidentiality to protect unauthorized disclosure, Integrity to detect unauthorized modifications (Liu et al., 2004).

In order to protect privacy it is therefore necessary to address the responsibilities of organizations that collect personal information and organizations that receive it. Privacy issues of Electronic Health Records (EHR) have been a major inhibitor in the implementation of Electronic Medical Records (EMR)/Electronic Patient Record (EPR) systems. Researchers classified privacy issues in seven major categories: consent, transparency, and control over the record, collection limitation, data security, accuracy and identifiers (Ray & Wilmasiri, 2006).

Due to this dilemma in privacy and PI protection, a new set of technologies, so-called Privacy-Enhancing Technologies (PETs), has been developed to help individual users control the amount of personal information they disclose in an online transaction. There are many different PETs available to Internet users, which encompass certain programs that allow users to manage the cookies that web sites place on their hard drives. Others provide the ability to surf on the Internet anonymously so that advertisers cannot track a user's shopping habits. These tools provide certain privacy to the users of the Internet, so that they can take full advantage of the technology (Senicˇar et. al., 2003).

One of the common measures for privacy online is the World Wide Web Consortium (W3C) that has a recommendation of Platform for Privacy Protection (P3P), which notifies and publicizes the website's policy in the machine-readable format, in the form of a Protocol and XML schema. On the other hand, at the user's side, the user sets his privacy preferences in the agent that is used together with the browser and while the user visits a web site the agent matches the website's security policy with the users own privacy preferences (Chowdhury &Ray, 2007).

Although P3P provides a technical mechanism for ensuring that users can be informed about privacy policies before they release personal information, it does not provide a technical mechanism for making sure sites act according to their policies nor does it include mechanisms for transferring data or securing PII in transit or storage (http://www.w3.org/TR/P3P/). Researchers proposed privacy critics that include agents providing users with feedback on the potential privacy implications of their action (Dourish and Palen, 2003)

User's confidence in online transactions increases as they are presented with meaningful information and choices about web site privacy practices. P3P does not set

minimum standards for privacy, nor can it monitor whether sites adhere to their own stated procedures. It just enables to the user good view on the possibilities of its privacy protection on the Web (Senicˇar et. al., 2003). In addition, these measures do not provide any means for privacy enforcement. Such a solution would require the cooperation of a number of human and organization roles in the context of an eHealth service. Moreover, this highlights the need to understand user's attitudes to privacy and to further know the factors that affect eHealth acceptance in the sense where some factors might outweigh others when benefits are reflected in behavioural intention. This research therefore provides interesting insights and findings where technology acceptance is tested in quite a different cultural setting, which is expected to have different impacts compared to other western cultures. Egypt also is a dominant county in the Middle East and Arab world. This position usually places other countries as followers to anything new tried out in Egypt such as in media production, science in general, engineering, medicine etc. Results from this research could serve as recommendations to similar cultural settings as well as fair comparisons that could be done with the rest of the Middle East due to them sharing similar cultural views and the same mother tongue.

2.6.1 Managing eHealth Privacy in Organizations

As organizations place greater emphasis on building long-term relationships with customers, trust has assumed a central role. A successful relationship requires businesses to describe their information collection practices and policies on its release. Customers in turn must be willing to provide personal information to enable businesses to advance the customer relationships through improved offerings and targeted communications (Liu et al., 2004).

The success of healthcare organizations depends on the productivity of caregivers and staff. Caregivers might spend most of their time completing paperwork instead of treating patients. Maintaining paper-based records can be a challenge where staff must deal with lost charts, duplicate records, and records that are not available for days or weeks during transcriptions (Cisco Systems, 2005).

Since healthcare services involve the cooperation of a number of groups of people and organizations (ex: hospitals, clinics, pathologists, radiologists etc.), any methodology for privacy management must support cooperation within and across organizations – hence it is called cooperative management (Chowdhury & Ray, 2007). The sensitivity characterizing personal medical data further complicates the problem. Healthcare users may be discriminated or socially disliked or unaccepted by the exposure of sensitive information (Ray & Wilmasiri, 2006). However, a successful implementation of a

distributed EHR framework should not require the users to have to make too many complex decisions with regard to the security of the document they are examinig. On the other hand, healthcare providers should also have the flexibility to define the security of a particular document that is needed (Ray & Wilmasiri, 2006).

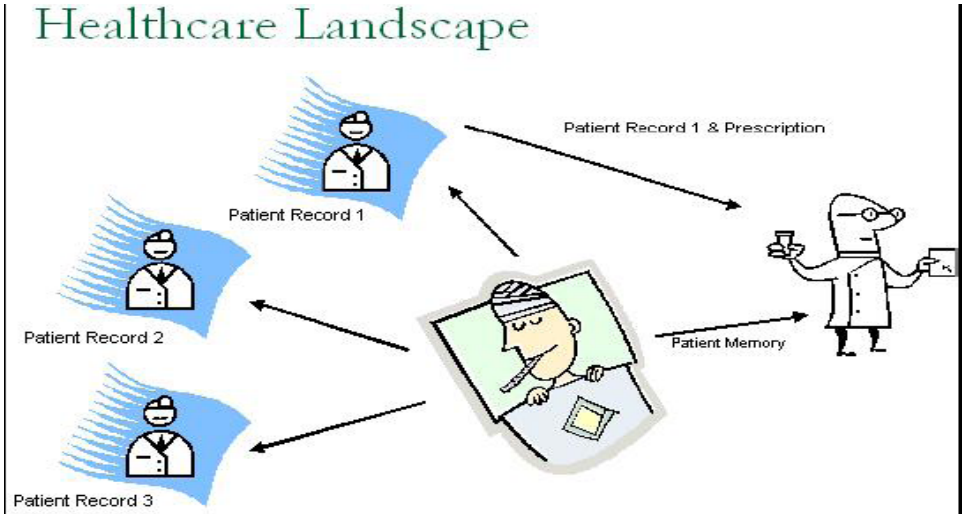


Figure 2.2 - Healthcare landscape (Wilmasiri, 2006)

The situation is illustrated in the above figure, as stated by (Ray and Wilmasiri, 2006), the patient visits multiple healthcare providers where each has a unique version of the patient healthcare status, also each would like to have an integrated healthcare status of their patient summarized from the all patients records. When doing this each provider has the responsibility to protect his patient's records in terms of privacy of EHR.

2.7 Technology Approaches and Ambient Technologies to Protecting Privacy

Examples of current eHealth services are myDNA.com (health information), WebMD.com (health information and technology solutions provider), e-med.co.uk (online medical consulting) and Walgreens.com (online pharmacy) (Yee et al., 2006). According to (Yee et al., 2006) the eHealth service is performed by application software that is owned by a provider (usually a company) accessible over the internet. The provider also has a privacy policy that states what user personal information is needed to perform the service and how such information is handled. The user has a personal privacy policy which states what personal information he is willing to disclose and how that information will be handled by the provider.

(Yee et al., 2006) proposed an approach that uses selective disclosure of the user's information and a smart card, in addition to the user's personal privacy policy to keep control of the user's personally identifiable data in the hands of the user as much as possible. This approach is based on the fact that once the users' personal information is in the hands of the service provider, it is very hard to detect that the provider has violated the user's privacy preference. The goal is to protect the privacy of an eHealth user according to the user's privacy policy usually by removing the user's PII from the possession of the provider. This is done by having the user's PII in a smart card, called a privacy controller, owned by the user and in his possession. Smart cards have been have been applied across many domains including e-commerce making them ideal for portable data applications requiring security (Yee et al., 2006).

Certain consulting services do not require PII other than for payment plus physical delivery, and online pharmacies (Yee et. al, 2006). Some researchers like (Clarke, 2005) reported that smart cards user complained that the use of cards was destroying privacy, he also addressed pseudonyms and trusted third parties.

Another approach presented by (Lategan & Olivier, 2005) is called PrivGuard for protecting private information (PII). It classifies PII based on how the information will be used and designing methods for protecting each information class. (Liu et al, 2005) stated that little empirical research has been conducted to examine the relationship among the three constructs - privacy concerns, trust, and behavioral intentions. They developed a model that's objective was to propose and test a theoretical model to explain how privacy influences trust and trust influences consumer behavioral intention for online transactions. This model is illustrated in (Fig. 2.3).

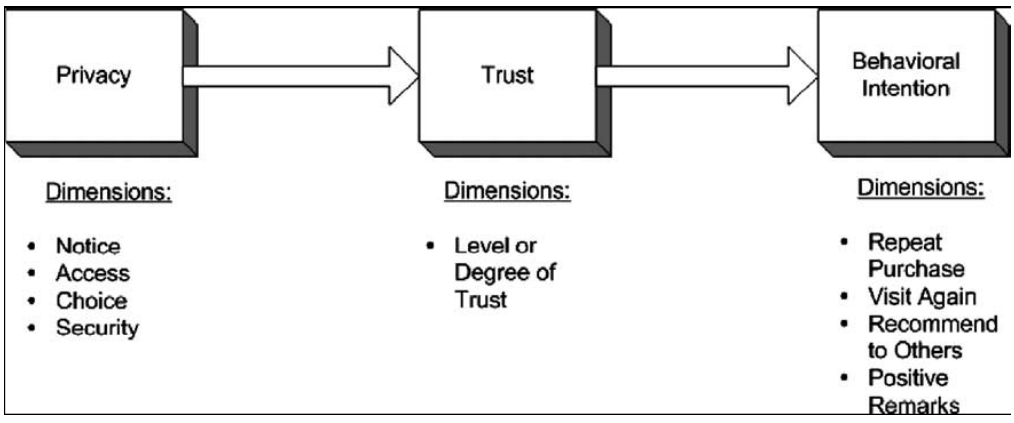


Figure 2.3 Privacy-Trust-Behavioral Intention Model

2.8 Privacy Policies and Regulations

Privacy can be protected by measures that include proper legislation and usage of privacy-enhancing technologies and mechanisms. In this section, the researcher discusses the different forms of policies, as well as legislation standards /regulations in the area of privacy protection.

Privacy policies describe an organization's data practices including: what sort of information is collected from individuals, for what purpose the information will be used, whether the organization provides access to the information, who are the recipients of any of the information, how long the information will be retained, and who will be informed in the circumstances of any dispute (Hung, 2005). Due to the growth in users' concerns over privacy protection, world-wide organizations began issuing privacy policies or statements on their web sites. Such policies or statements are descriptions of sites' practices for online collection, use and dissemination of personal information (Liu et al., 2004). As stated before, there is no guarantee that these policies work as they state.

The U.S. Federal Trade Commission (FTC) proposed and advocated that fair information practices included four dimensions (Liu et al., 2004):
1- Notice: providing people notice that personal information is being collected prior to the collection of that information.
2- Access: providing people with access to the data that is collected about them.
3- Choice: providing people with a choice to allow an organization to use or share information collected about them.
4- Security: providing reasonable assurance that personal information is kept secure.

Furthermore, The European Union developed the new Directive 2002/58/EC of the European Parliament and of the Council, from 12 July 2002, concerning the processing of personal data and the protection of privacy in the e-communications sector that takes into account new technological developments and enables users to take control of their personally identifiable information (PII). However, this is just a framework addressing all relevant players (users, service providers, institutions, business, commerce, etc.) in the protection of privacy over e-communications (Senicˇar et. al., 2003).

Taking eHealth in context, being as an inter-jurisdictional enterprise, it presents risks to patient health data that involve not only technology, but also laws, regulations and cultures. The USA Patriot Act is one example of how national laws can shape these concerns. On a global scale, this may seem irrelevant for the development and deployment of eHealth since the legislation only applies to corporations and agencies in

the U.S. However, multinational corporations that have U.S. parent corporations and affiliates providing healthcare the threat to privacy hence expands to the global arena (ibid). In the healthcare industry, trade association and professional organizations have led in the development of eHealth codes of ethics. These codes of ethics provide voluntary standards for healthcare-related web sites, a statement was made - “these initiatives have produced clear, easy to understand guidelines for ethical behavior” (www.ihealthcoalition.org/content/article-evolve.html) (Bodkin and Miaoulis, 2007). Some progress in this regard has been made in the European context, however, developments are incomplete, and nothing similar has been accomplished on a global scale (Kluge, 2006). Similarly in Egypt, there are no laws governing the privacy of health care data online as emphasized by senior officials working at the Ministry of Health and Population in Egypt (MOHP). Ethical considerations in day to day medical practices are governed by the Hippocratic Oath that doctors swear upon graduation form medical school.

The legislation and standards like the health insurance portability and accountability act (HIPAA) has provided a set of standard policies that the healthcare providers have to exercise in order to protect a patient’s privacy. In Canada (e.g., Bill C-6, Personal Health Information Protection Act) and strong industry standards adoption (ISO 17799) has led to heightened awareness of privacy issues in eHealth care informatics (Hung, 2005). Privacy and confidentiality of information are closely related to security of eHealth care information use and distribution. Privacy enhancing technologies have been researched for a period of time but there is as yet no standardized technology proposed (ibid).

2.9 Summary

Information technologies like the Internet and databases have advanced in the past years. With the adoption of such technologies, the healthcare industry is able to save millions of dollars in administrative and overhead costs. Such savings can be used to discover new drugs and expand coverage for uninsured people (Fung and Paytner, 2006)

Privacy Protection is essential to ensuring that people have access to high quality healthcare without privacy violations. The Internet and other e-models of healthcare delivery continue to challenge the privacy and security of personal data. Smart cards applications offer the field with new methods for improving data integrity, validation and accuracy. To this end, digital mechanisms for storing medical images increase the need to safeguard personal data without compromising quality. Thus, protecting privacy,

safeguarding data and promoting healthcare quality are embedded concepts and stand to impact to one another (Payton & Chismar, 2002). However, these sites also require to store and share substantial amount of consumer personal information for research purposes or to deliver health services. The question of informed consent and privacy are some of the primary needs of the consumers and it is hard for consumers to trust the website with so much personal (sensitive) information revealed. For this reason, eHealth sites in the future need to satisfy the consumer and disclose to them how their privacy of personal information will be protected (Chowdhury &Ray, 2007).

In most countries, eHealth care informatics is characterized as sensitive information that might be considered the most intimate and personal information about an individual (Hung, 2005). This has been found when the literature review has been investigated in this context where countries like the U.S., UK, Japan, Australia and Canada agree on this. Healthcare information is considered sensitive because electronically stored data containing sensitive information can be easily and conveniently released, and disclosing sensitive information to outsiders can cause direct and indirect damage to an individual. The fact that technology can lead to aggregation and distribution of such data to a wide variety of user like eHealth care practitioners, researchers, lawyers and business and government policymakers has led to elevation of concerns on privacy and security (Hung, 2005).

According to the importance of this research and the growing concerns of privacy towards eHealth, an extensive literature investigation has been conducted. Aspects such as e-privacy, privacy concerns in different countries and contexts like general e-commerce transactions and specifically eHealth services have been investigated. Furthermore, user attitudes towards eHealth services, privacy, e-commerce transactions, and Internet use in general has also been investigated from surveys results (that are a limited number as mentioned by other researchers previously). The results demonstrated from such surveys may be compared with the results of this research study but with caution.

In addition, a gap was found in the context of users' acceptance of eHealth technology regarding the factors that affect their acceptance. Particularly, it was necessary to investigate other factors - in addition to the known technology acceptance ones - such as attitudes to online privacy, online trust, satisfaction with medical care and Internet experience and exposure to adapt technology acceptance to the eHealth domain. This has especially placed a need to understand the factors that affect eHealth acceptance in Egypt.

Findings of such investigation will help in establishing the eHealth initiative in Egypt by first pointing out the acceptance factors that have an effect on eHealth acceptance. For example, is there a high concern for privacy? Are the benefits outweighed against the risks or attitudes to privacy? Is the perceived usefulness of the technology actually understood? Is it perceived as easy to use? Can doctors really influence the patients to use such technology? Does Satisfaction with current medical care have a role or impact in technology acceptance? Do Internet users actually trust the Internet as a place for conducting electronic transactions? Many more questions were translated to hypotheses for this thesis results. The result of the testing of these hypotheses gave implications and recommendations to organizations that will take over to implement the eHealth initiative otherwise it could be just implemented and not used by people if these implications are not considered especially that this research focuses on the patient side who is nevertheless an important user for eHealth just as the doctor or health care provider.

Increasingly, ICT is used to execute and facilitate such self-management practices, and with advantages for both doctors and patients. However, significant technology acceptance issues could arise when innovating in health care. Therefore, for an eHealth initiative or to further optimize the use of ICT, information is needed to determine the critical success factors of technology acceptance by patients. The next chapter explains the methods used in this thesis, and it also explains in detail the pilot study undertaken. Chapter 4 discusses in details the available literature on technology acceptance models and factors that affect eHealth acceptance. One of the technology acceptance models seen by researchers as a promising emerging theory is the unified theory of acceptance and use of technology (UTAUT). The UTAUT was employed for modeling eHealth technology acceptance in this research with added online privacy, online trust, Internet experience and exposure and satisfaction with medical care factors.

Chapter 3 - Research Methodology

This chapter provides a detailed strategy of methods used in this research to tackle the research question and gives a justification of the methods used. It highlights and presents some findings of similar work within the context that have adopted similar research strategies then explains the methodology used starting with a brief presentation of the research design and the procedures for conducting the study (described in section 3.3). Next, the chapter investigates the knowledge claim relevant to the research design, which paves the way to selecting a research strategy that could best fit this study. The chapter then presents the research methods employed under the chosen research strategy explaining the preparation for data collection phase including pilot testing of the instrument developed for collecting quantitative data and sampling technique. Finally, the chapter provides an explanation of the analysis of both quantitative and qualitative data, research reliability and the approaches used for data validation.

3.1 Flash Back on the Research Background

A comprehensive review of the literature revealed that there is a lack of clear conceptual and operational definitions of technology acceptance in eHealth and also in Internet privacy.. While this is true of many other constructs, however it is problematic to an extent for relatively new areas where there is scarcity of empirical research such as eHealth acceptance merged with privacy issues from the user's perspective (Johnson, 2008). Furthermore, technology acceptance models/theories and their constructs do not have a unified or formal definition in literature particularly when talking about the eHealth context. Mostly technology acceptance models that have been extended or used in the eHealth domain focus on physicians' acceptance and yet there are no formal definitions for the constructs. This was widely emphasized by many researchers in the field such as (Or and Karsh, 2009; Wilson and Lankton, 2004, 2006 and Or et al., 2010). Due to the limited research on patient acceptance, careful research and literature investigation for the constructs' definitions was necessary. A closer look to how constructs were used in eHealth (with a user/patient perspective) was needed although many limitations were faced regarding construct operationalization; however, it was a necessary step to do. Due to these circumstances and limited literature on eHealth technology acceptance with a user perspective, a pilot study definitely was needed (Details of the pilot study is described in section (3.4) below).

Usage statistics suggests that the Internet brings about eHealth success but issues around information quality, user interactions and personalization raise questions for both researchers and designers. The move towards ubiquitous computing increases these concerns and highlights the relevance of trust, privacy and disclosure (Sillence et al., 2008). As stated by (Ackerman et al., 1999), numerous surveys conducted around the world have found consistently high levels of concern about privacy.

Hence, this justifies the research objectives, which is the investigation of the influence of technology acceptance factors on the acceptance of eHealth. This section explains how this study will further investigate the correspondence of privacy concerns within the eHealth domain along with other nevertheless important technology acceptance factors. One outcome of this research was to observe the change in users' perspectives towards online privacy over time. Technology evolution over time has definitely changed people's lifestyles and Internet use for different purposes. Therefore the question "what people think now about using the Internet" might be interesting even though valid comparisons need to be done with caution due to different geographical locations, different cultures and different era for example.

Since eHealth deals with data of a sensitive yet confidential nature, the users' concerns over privacy are higher than that associated with other e-commerce transactions. Users are less comfortable when providing health data as compared to purchasing or selling, and information exchange over the Internet. Trust in online transactions also affects user's perception of confidence in a web site (Navarro and Wikins, 2001), and is a key predictor of user's intentions to interact with a web site (McKnight et al., 2002). Thus, lack of online trust prevents individuals from seeking healthcare (Bodkin & Miaoulis, 2007). Limitation in the literature review posed a need to investigate the impact of users' perceptions and attitudes towards online privacy, who use the Internet in their daily life, on their willingness to uptake eHealth.

Egypt has relatively high education illiteracy rates among its population; therefore it was important for the research participants to be Internet literate people. The reason for people being Internet literate is that when talking about eHealth the computer/internet illiterate category of people will not be able to comprehend what it is meant to be. Therefore, presumably, their perceptions to use it whether people think eHealth is useful or easy to use in addition to users behavioural intention towards eHealth wouldn't be clear or accurate. However literate people in Egypt even if they belong to the low standards of living group, do use the Internet extensively and are aware of different services that can be used on different devices (mobile phones, laptops, PCs and others). Examples of these services that have been extensively used by people range

from social services for communication (Facebook, chat, etc.) to e-government services. Similar to eHealth is e-government services that were established in Egypt (extensively used by citizens for the past seven years) had needed people to have some Internet experience before its use. Hence, the study sample includes randomly selected people yielding a study sample with different demographics and different computer/Internet experience which can be used to further compare the results with those available from the literature.

3.2 Methodology Introduction

A number of taxonomies of Information systems research have been suggested over the years. A distinction has been made by (Galliers, 1992) and (Weick, 1984) as well as others between the two terms ***Research Approach*** and ***Research Methods***. *Methods* are simply ways to systematize observation and *Approaches* are a way of going about one's research. While the term "Research Approach" may embody a particular style and may employ different methods or techniques, this makes ***approaches*** a more generic concept than ***methods*** (Galliers, 1992)***.***

Moreover, (Strauss and Corbin, 1998) defined *methodology* as "a way of thinking and studying social reality". Methods are a set of procedures and techniques for gathering and analyzing data and finally coding is the analytic process through which data are broken down, conceptualized and integrated to form theory. Strauss and Corbin, (1998) suggested that both qualitative and quantitative methods might be used appropriately in any research paradigm, which is defined as the basic belief system or worldview that guides the investigator. The issue of appropriate method is only secondary to the choice of the appropriate paradigm (ibid).

Both qualitative and quantitative methodologies have strengths and weaknesses, and these often invoke paradigm wars and philosophical debate among the supporters and opponents of qualitative versus quantitative approaches. To make a decision that one approach is better than the other underestimates the complexity, richness, and varied traditions/disciplines underlying each of quantitative and qualitative research approaches. Both approaches have been used to study almost any research topic in various academic disciplines such as social sciences, natural sciences, humanities and others (Robson, 2002).

Johnson, (2008) stated that by combining qualitative and quantitative approaches in a "mixed method" approach adds value. However, all data are first seen as qualitative. Then researchers sometimes attach quantitative measures to them or vice versa. This

is evident from early works in various academic disciplines, which primarily relied on general observations about a society or a group or a specific phenomenon (qualitative).

Quantitative research paradigm leads to the quantification of the observation. This sequence of qualitative leading to quantitative approach is also true in the instances where variables have to be conceptually defined and interpreted before they can be measured and quantitative data becomes available. When quantitative data is available, further qualitative research will enhance the understanding of the construct under study and it will overcome the drawbacks that might arise from the quantitative study alone.

On the other hand, quantitative methods have advantages like reaching a large sector of the population which qualitative methods are limited in. Thus, quantitative methods are used in this research study for their advantage of obtaining a larger sample than qualitative methods can. However, the researcher chose to undertake a “mix method” consisting of questionnaires along with interviews for in-depth understanding of technology acceptance factors and to understand the feasibility of having eHealth in Egypt from the perspective of the Ministry of Health and Population (including MOHP officials, hospital managers and some doctors). As mentioned by (Hamilton and Ives 1992) ‘good research, is not just in choosing the right research method but in asking the right question and picking the most powerful methods for answering the questions given the objectives’.

3.3 Research Design

First, the research process starts with an investigation of the literature. This investigation included issues such as definitions of privacy, privacy concerns, the impact of technological changes and the Internet on healthcare, risks of privacy invasion, various factors involved in technology acceptance in general and in particular to the health context and the relationship between these factors. Such investigation uncovers the research gap found in the topic due to limited literature.

According to the investigation of the literature and due to cultural differences between Egypt and other research done in different countries, the methods used in this research has been determined. These are both quantitative methods (questionnaire) and qualitative methods (interviews).

Second, a pilot study has been carried out to get feedback on the questionnaire design aspects from respondents. The feedback on these design aspects allowed for enhancements of the questionnaire design, rephrasing of some questions where needed and even designing new questions and removing existing ones where relevant.

Furthermore, because eHealth data are of a sensitive and confidential nature, a preliminary questionnaire was planned and carried out using a sample of Internet users to gather initial data where users had different demographic characteristics, different Internet usage habits, and different Internet time usage. The first phase of the research study helped to understand user's awareness and attitudes to e-privacy as well as their awareness of eHealth. In addition the pilot study also involved a group of professionals and researchers in e-privacy, technology acceptance, enhanced technology developers for eHealth (Philips) and eHealth researchers, which provided updates for the survey design features and questions' wordings.

Furthermore, it was necessary to examine the factors related to privacy concerns with respect to Egypt and the factors that affect the uptake of different e-services generally and eHealth specifically. The degree of comfort of these users towards different e-services like general e-commerce transactions and eHealth transactions, e.g. whether they ever participated in eHealth services, who would they prefer to have access to their health data, are they willing to communicate with practitioners through online communications like email, online prescriptions, online booking of appointments etc. was also investigated which pertain to technology acceptance factors.

The second phase of the research study included a series of Interviews conducted with the Egyptian Ministry of Health and Population (MOHP) officials (particularly in the IT/MIS department) and with hospital managers and some doctors to understand the other side of the research like whether there are any potentials for use of eHealth, what are the privacy concerns, ideas of who will have access to the data when the service is launched, any training done for doctors on IT use, state of automation of hospitals till and perception of technology acceptance factors. Factors obtained from this stage of data gathering helped to examine the relationship between such factors and the acceptance of eHealth services from their side as well as understanding the whole picture regarding technology acceptance in Egypt.

Thirdly, data obtained were analyzed using SPSS version 19 for Mac to present the results of the research study and suing AMOS to test the research hypotheses and build path diagrams for each hypothesis.

In addition, a list of recommendations and implications to consider with the acceptance of eHealth as an initiative that was planned to take place in Egypt was presented. This was done taking into consideration the research factors and constructs discussed. These recommendations and implications were depicted in a proposed research eHealth technology acceptance model as a extension of the widely known Unified theory of acceptance and uptake technology (UTAUT, Venkatesh et al., 2003) with added factors including: attitudes to online privacy, online trust, satisfaction with medical

care and Internet experience and exposure. The results of the study may have implications for managerial and government regulatory bodies establishing Internet privacy with further research based on the present findings. Also, the findings may be used to address national citizens concerns through evidence-based education programs and the development of health management strategies regarding the uptake of eHealth as a future governmental service. It is hoped that these results will form the basis for future research with other groups of people especially as it also relates to trust, risk, e-readiness and technology acceptance, which makes research on these results interesting in different contexts.

Given the multidimensional nature of privacy concepts, a lack of a comprehensive conceptual framework stated in the literature (Johnson, 2008), and the nature of the research question, a mixed-method design including both qualitative and quantitative research approaches is more appropriate for the present study. By combining multiple methods, researchers can hope to overcome the weaknesses and that come from using a single method (Johnson, 2008).

In summary, an intensive investigation of the literature on the research topic has been undertaken and continued to the end of the thesis. In addition, a detailed design of the research study has been made and carried out where the first stage of the study involved the design of the pilot study questionnaire. Following feedback and re-design the amended survey was conducted. The second part of the study Interviews were carried out as part of the pilot study and some interviews were carried out after the pilot was completed. The findings form interviews helped in amending the questionnaire and understanding the underlying concepts regarding eHealth acceptance in Egypt. The third part of the study constituted a quantitative analysis of the questionnaire data to arrive at numerical estimations and statistical inferences and formulating the final eHealth technology acceptance model using AMOS (an add-on software tool with SPSS) to generate the final mode fit.

3.3.1 Research Gap

This investigation focuses on the impact of technological changes and the Internet on healthcare, attitudes to privacy, risks of privacy invasion, and technology acceptance factors affecting eHealth uptake.

Such investigation uncovers the research gap that was found due to the limited research available in the topic when talking about technology acceptance factors including privacy, trust, Internet experience and satisfaction with medical care which were combined together to model user's acceptance of eHealth technologies. An

extensive investigation and study of the literature shows limited research has been found in areas like:

1) User's perceptions of e-privacy and its effect on the uptake of Internet services like eHealth,
2) Limited research on eHealth acceptance in general and very limited on eHealth acceptance particularly in Egypt.
3) Most of the literature found relates to e-commerce transactions when talking about e-privacy,
4) Limited literature when talking about the notion of privacy and confidentiality in eHealth and not related to technology acceptance models and their factors.
5) Limited research on the effect of technology acceptance factors perceptions on day-to-day Internet usage including eHealth use.
6) No research on modelling user' acceptance of ehealth taking into consideration all the proposed factors (some research considering some of the fators).

Limitations in literature posed a need to uncover the gap found which is particularly in how the factors pertaining to technology acceptance might in turn affect eHealth acceptance in Egypt (defined as behavioural intention to use eHealth), this lead to designing two phases for the research study.

Most of the Internet privacy and security studies have used a quantitative research methodology. The development of questionnaires that operationalize new constructs has been the common practice in HCI and in other fields (Johnson, 2008). Furthermore one can measure how two or more artifacts compare on a certain quality dimension such as trust using validated questionnaires (ibid). Moreover, (Johnson, 2008) stated that several other studies reported in the literature, reported that quantitative research methodology is appropriate. While qualitative study of the phenomenon of Internet privacy and security would add to the existing literature, few studies to date have examined Internet concerns using a qualitative methodology (ibid).

However, as reported earlier, limited systematic, empirical studies are available and the results are often ambiguous (Sabel, 2005; Ellison et al., 2001; O'Neil, 2001). The inconsistencies in the findings might be partially attributed to differences in the methodologies adopted.

3.3.2 Selection of the Pragmatic Approach and Research Question

To arrive at the methodology to be adopted and realizing each stage in the research design; an investigation of the research methodologies was done to set a pragmatic approach that provided guidance through the overall research process. Creswell (2002)

suggests that the research design can be set based on the following three main issues:

- The epistemology (or knowledge claim) is to be selected by the researcher.
- The research strategy (or strategies) that could be relevant to this knowledge claim.
- The research methods to be adopted for data collection and analysis.

Epistemology is positioning the research philosophy which gains special interests from the part of researchers because it aids them to analyze not only their work but also others work and ascertains the academic credibility of a research field (Heeks and Bailur, 2007).

In order to select the appropriate epistemology, it was important to identify the main paradigm of this research. It was based on the view of Newell et al. (1967) who define computer science as "the study of phenomena related to computers". Myers and Avison (2002) propose three epistemological categories of research: (i) positivist (and post-positivist), presuming that reality is objectively given and can be expressed through measurable means, mainly concerned with testing hypothesis and with quantifiable measures of variables; (ii) interpretive, assuming that reality can be discovered through interactions, based principally on understanding phenomena and how peoples' perceptions could be interpreted; and (iii) critical, suggesting that reality is in a continuous shaping by people who have limited capability to change their social and economic status due to various constraints, essentially directed towards criticizing and highlighting these conditions or constraints.

Clarke (2005) classifies research traditions in information systems and particularly in e-commerce into three main categories: (i) conventional scientific research (or positivist), proposing hypothesis that should be tested to provide feedback which could guide in formulating a theory; (ii) interpretivist research, assuming that reality can be differently interpreted depending on many factors in addition to the researcher's perspective; and (iii) engineering research, including artifacts, techniques, or both of them.

The researcher therefore found that a positivist approach was the most relevant to be used in terms of its compatibility with the research process identified in the beginning by using quantitative empirical research. However, this was also complemented with qualitative methods particularly interviews with government officials, hospital managers and doctors that was needed to understand the other side of the coin (whole picture) in terms of technology attempts and automation status of health care services in Egypt. This lead to using the so-called "Mixed methodology approach".

Using a mixed method approach also attributes to the novelty of the research topic in the context of eHealth in particular where most studies either used quantitative or

qualitative approaches alone. The first stage of the study comprising the survey was planned and carried out using a sample of the Internet users' to gather initial data. Results have shown that users that fall under different age groups, with different soci-demographic characteristics, different Internet usage habits, and different Internet time usage. The survey also uncovers the degree of comfort of these users towards different e-services like general e-commerce transactions and eHealth transactions like whether they ever participated in eHealth services, who would have access to their health data, have they ever used health services on the Internet to gather information on health issues or diseases for themselves or for any of their relatives and the degree of comfort towards using eHealth services.

A clear understanding of users' perceptions and attitudes towards e-privacy aids in explaining the relationship between e-privacy and the acceptance of eHealth. Data gathered and analysed from the research was used to develop the extended technology acceptance model leading to an enhanced version of the original UTAUT model. Hence, one of the research outcomes is the proposed eHealth technology acceptance model with online privacy attitudes, online trust and Internet experience and exposure factors.

The limitations identified in the literature review (discussed above) allowed for research question to emerge:

How do online attitudes to privacy and other technology acceptance factors affect the acceptance of eHealth in Egypt?

The research question was broken down into four smaller sub questions:

1- Are users aware of the concept of e-privacy? What are the users' perceptions and attitudes to privacy when transacting online?
2- Do these general attitudes to privacy (privacy concerns) affect the acceptance of eHealth in Egypt?
3- What are the significant factors that might affect the acceptance of eHealth in Egypt?

The independent variables in the research question are those related to technology acceptance factors: performance expectancy, effort expectancy, facilitating conditions and social influence; in addition to attitudes to online privacy, online trust and Internet experience and exposure added factors. The dependant variable here is the

behavioural intention, which is the acceptance of eHealth in Egypt. Behavioural intention is an antecedent to actual uptake of eHealth.

3.3.3 General Research Hypothesis

There is an assumption that technology acceptance factors might impact the acceptance of eHealth in Egypt. In addition there is an assumption that user's attitudes to online privacy, online trust, satisfaction with medical care and Internet experience and exposure have an impact on the use of eHealth. As mentioned in the previous section, one of the factors found to influence acceptance was Internet experience and exposure. Privacy concerns and attitudes of people was also found to negatively affect the acceptance of eHealth which characterizes Egyptians as "privacy valuers". Meaning the more people feel that their health data is kept private the more encouraged they are to use eHealth sites and services and vice versa. The general hypothesis was broken to single hypotheses testing each factor that might have a role in the acceptance of eHealth technology. These are formulated and discussed in details in chapter five and hypotheses were tested and discussed in detail in chapter six.

In summary, In order to answer the research question addressed earlier the following strategy was used:

First of all a pilot study was conducted followed by the survey questionnaire. Interviews were conducted in parallel as part of the pilot study that helped in amending the questionnaire wording, understanding the conceptual meaning of eHealth acceptance in Egypt and deeper understanding of managerial views from the other side (practitioners and government). Determining the philosophical assumption governing the research led to a subsequent stage that involved the investigation of the most relevant research strategies. Since the positivist approach selected for the study is associated with setting hypotheses and seeking to test them empirically, the researcher deduced that two strategies are relevant to this approach that could serve in reaching the research objectives: surveys, and Interviews.

3.4 Data Collection and Preparation

3.4.1 Pilot Study

The first phase of the research comprises a pilot study for a predesigned questionnaire. The main role of the pilot study is getting feedback from respondents on different aspects concerning the questionnaire. Such aspects include design considerations,

length, misunderstanding, unclearness and feedback that might help in reformulating the research question and modifying the questions in the questionnaire itself regarding its relevance to the research question. Furthermore, after modifications were made that resulted from the pilot study on the planned questionnaire/survey, the survey study was distributed to a sample of randomly chosen Internet users (discussed in detail in section 3.2.1).

The pilot study involved respondents of different age groups from students above 18 to actual eHealth consultants, experts and researchers in the eHealth domain from the UK, Germany and other EU countries as well as eHealth ambient technology developers – particularly working for Philips. Also the pilot study involved professors in the IS field in Egypt and the UK, and governmental staff at MOHP (Prof. Dr. Salah Badr – Head of Information Systems and Information Technologies at MOHP and Dr. Doaa Fawzy - Vice president of the Supervisory and Control Institute over public hospitals under the MOHP as mentioned earlier).

Pilot testing of the measurement instrument was necessary to validate the items. This is because some of the measurement items were developed or modified for the purposes of this research. This approach helped in identifying the parts of the questions that required modifications and in refining the data collection plan as a whole.

In summary, the pilot study was conducted to (a) highlight any need to refine the research question, (b) to test the questions asked for their clarity, and focus regarding the aims of this investigation and (c) to get feedback on the questionnaire design aspects from respondents. The pilot study was conducted using a preliminary questionnaire directed to computer/Internet users. The questionnaire covers the following:

- User's information privacy awareness and user's attitudes to online privacy,
- User's eHealth awareness and understanding,
- User's willingness to engage in eHealth (Users' behavioural intention to accept and use eHealth).
- What users expect and their degree of comfort using electronic transactions and eHealth services,
- Usefulness and ease of use associated with eHealth services.
- Demographic characteristics of users (reflecting the Egyptian culture).

The feedback on the questionnaire design allowed enhancement of the questionnaire, rephrasing of some questions where needed and even designing new questions and removing existing ones where relevant, (Please find the final questionnaire designed in

Appendix A). A combination of these questions was used to grasp as much Information as possible from respondents. Respondents involved in the pilot study commented on design features, length, misunderstanding of questions, addition of some questions they felt might be important or could help them in understanding what is meant by the underlying concepts, and some even asked for some free line text for those who felt they wanted to elaborate.

The pilot study came up with three iterations of the survey. The first iteration included general Internet usage questions and two open-ended questions asking the users if they think that their personal information and their health information should be private and then asking them to list why. The other set of questions was asking respondents to list the type of information that they think is confidential. From here arose the main privacy concerns that users experienced. This approach was in line with the approach used by (Paine et al., 2007) who conducted an interview survey using a computer program that chatted with ICQ chat users. Their research was built on allowing respondents to list their privacy concerns as open-ended questions. Paine et al., (2007) arrived at privacy concerns that were very similar to those in this research albeit a few modifications to the questions were made regarding the phrasing and the addition of other privacy concerns in line with the eHealth context also validated from literature (Cranor, 1999; Malhotra et al., 2004; Harper and Singleton, 2001). Subsequent iterations included amendments before the final distribution.

In summary modifications were based on cognitive interviews with eHealth experts as mentioned, that lead to eliminating irrelevant items or rewording existing items for better understanding to the target sample. A total of 32 items were used to measure the 8 constructs in the proposed extended technology acceptance model based on the Unified Theory of Acceptance and Use of technology UTAUT (Venkatesh et al.; 2003) and demographics. This approach was in line to that adopted by many scholars in the HCI field such as (Beekens, 2011; Wilson and Lankton, 2006; Paine et al., 2007; Johnson, 2008; Azab, 2009). Necessary demographics were also collected for the purpose of valid comparisons to be made within the context.

The second phase of the research study depended on the analyzed and interpreted results obtained from the first phase. The second phase included part of the planned interviews. This phase's interviews were with hospital managers and some doctors from different specializations. The participants were asked about similar themes from the survey particularly concerning technology acceptance factors and privacy issues as well as state of the art regarding health technologies (see section 3.3.2). Interviews have also provided deeper understanding of managerial issues in the health sector.

Results of the pilot study determined the characteristics of the appropriate sample for

which the research should be addressed to in addition to evidence from the literature. The sample that was needed was Internet users randomly selected and this was recommended by eHealth consultants, eHealth researchers and by the senior governmental staff working in the Ministry of Health and Population (MOHP) in Egypt who participated in the pilot study.

3.4.2 Sample Selection

In the exact words of Sapsford (2007, p3), *"A survey describes a population; it counts and describes what is out there".* Sampling is about getting a group to survey (Sapsford, 2007 p51). Judgments are made about people, places, and things on the basis of fragmentary evidence (Robson, 2002 pp. 260). Sampling considerations pervade aspects of research and crop up in various forms no matter what research strategy or investigatory technique is used (ibid).

Probability samples as described by (Robson, 2002 pp. 263-266) include *simple random sampling*, which involve the selection at random from the sampling frame of the required number of persons for the sample. This makes each person an equal chance of being included in the sample and it also makes all possible combinations of persons for a particular sample size equally likely. It minimizes the fact that there will be systematic bias in sampling. Compared to *systematic sampling,* where only the first person is chosen at every starting point for example choosing a starting point at random in the sample frame then choosing every n^{th} person. A drawback of systematic sampling is that possible combination of people might not be chosen. *Stratified random sampling* involves dividing the population in a number of groups or strata where member of groups share a particular characteristic(s) e.g. Females and males. Another sampling technique is *cluster sampling*, which involves dividing the population into a number of units or clusters, each of which contains individuals having a range or characteristics where the clusters are chosen randomly. *Multistage sampling* is picking random individuals in random clusters determined when using a clustered sampling technique.

On the other hand, non-probability sampling includes all other sampling methods specifically used when the sampling plan does not specify the probability that any person will be included in the sample. One of the techniques is *Quota sampling* where the strategy is to obtain representatives of the various elements of a population usually in relevant proportion within which they occur in the population. Quota sampling is a technique also used in public opinion polls and refers to the fact that researchers decide what variables are potentially important for the views of the respondents (Beekens, 2011; Fitzpatrick, 1991). *Dimensional sampling* - another type of nonprobability sampling - is an extension of quota sampling, where the various dimensions that are

important in a survey are incorporated into the sampling procedure in such a way. However both sample means are subject to biases and representativeness (Robson, 2002). *Purposive sampling* is where the principle of selection is the researcher's judgment as to typicality or interest basically used in grounded theory approach. *Snowball sampling* is where the researcher identifies one or more individuals of the population of interest. These are used as informants to identify other member of the population who are themselves used as informants and so on. Robson (2002) specified that one or more sampling techniques maybe combined to reduce bias, getting larger number of respondents and whenever the research needs to do so (pp263-264).

Accordingly, after the study of relevant sampling strategies and according to feedback from participants in the pilot study conducted, it was determined that a random sampling method is appropriate. The fact that there aren't groups of people that have used an eHealth service formerly who can be surveyed for example, simply because they don't exist in Egypt yet, has therefore concluded that random sampling was the most appropriate method. A random sample of Internet users was used in light with the limited resources available for the research and according to the fact that illiteracy levels are high in Egypt. Generalizations are feasible to be produced because the sample was randomly selected which reflects people with different demographic characteristics but with caution taking into consideration culture and context differences.

The idea of sampling is linked to the population (Sapsford, 2007 pp51-53). The target population of this research is Egyptian Internet users (total number of Internet users in Egypt are 16,000,000 as mentioned in Chapter 1 at the time of determining the sample). The sample required, according to the sample calculator available online and according to sample size table in research methods books, is therefore 384 people (this number is the same for all populations above one million). Number of questionnaires collected in this research study was 402 responses from both online and hardcopy sources. A response rate was difficult to be calculated since part of the questionnaire was distributed online through snowballing techniques.

According to (Sapsford, 2007), some questions regarding sample selections that were considered when deciding on the sample are: what is the target population? How can one get a representative sample of them? What can be done to get a representative sample give resource limitations? Accordingly the research sample was chosen.

The target sample is characterized as technology literate or even more specific computer literate/Internet users. This selection criterion not just filters the population but is of necessary existence due to the limitation facing the research from high illiteracy levels in Egypt and it being a developing country. However, computer advancements in

different sectors are available, affordable and in use by the educated and computer literate who are mostly dispersed in cities. The relevant parties involved in the pilot study described earlier also recommended the necessity for this criterion.

Due to randomization, the sample furthermore represents Internet users working in different sectors and of different demographics. Examples are those working in banks, people in the academic field, automotive industry, pharmaceuticals, medicine, administrative staff, engineering, petroleum, students and others. Due to the drawbacks of low response rate that was expected when conducting the online version of the survey as mentioned by Robson (2002), the Head of IT/MIS department at the MOHP in Egypt, recommended visits to be done to predefined public hospitals and continue the random distribution of the survey. Recommendation was based on directing the researcher to the Vice President of the control institute that supervised all public hospitals in Egypt. She has recommended five public hospitals based on their geographic dispersion, automation status and the types of patients that are likely to go there taking into consideration and confirming the need for the internet literacy criterion. Furthermore, using snowballing techniques, the questionnaire was distributed in different organizations, universities, institutes etc. in hardcopy form as well and also online through emails with the questionnaire URL, if the snowballing person didn't have direct access to respondents to distribute a hardcopy.

In summary, as Cairo is the capital of Egypt, which geographically includes citizens from all over Egypt from different areas due to jobs, governmental bodies/institutions, main banks, main hospitals, main universities etc., which added to the richness of distribution. Both data gathering methods (online surveys and hardcopy surveys) were distributed at random and included respondents that are all categorized as computer literate users that obviously use health care services.

Random sampling is necessary form the point of view of the researcher, pilot study undertaken as well as the extensive investigation of the literature on sampling in eHealth acceptance, which was justified by (Wilson and Lankton, 2004; Holden and Karsh, 2009). This choice was made because there aren't any patient groups that have been using a certain eHealth technology or service that can be used as the target sample for example. Random sampling techniques used in this study also helped to prevent possible biases when focusing on certain groups. However, the results have shown that an average spread of age among respondents was difficult to attain because the higher the age the less computer literate they are. However, such disadvantage could be overcome once the eHealth initiative is established where relatives like sons or daughters of the elderly will be able to participate in eHealth on behalf of their parents for example.

3.5 Research Strategy

The simplest way to distinguish between qualitative and quantitative methods is that qualitative methods involve a researcher describing kinds of characteristics of people and events without comparing these events in terms of measurement or amounts. On the other hand, quantitative methods focus on measurements and amounts (more and less, larger and smaller, often and seldom, similar and different). By this notion, the researcher undertook a mix of both research methods because the research question imposes a need to answer questions like how often people use the internet per week (*how often)*, are people aware of information privacy (*yes or no*), how often do users engage in eHealth sites *(again often and not often)*, how concerned are users about their privacy *(much concern or less concern)* etc. Hence, the researcher used both questionnaires and interviews.

Social and behavioural science researchers can be categorized in three groups. These are a) quantitatively oriented QUANS working within the post positivist tradition and primarily interested in numerical data analyses; b) qualitatively oriented QUALS working within the constructivist tradition and primarily interested in narrative data analyses and c) mixed methodologists working within other paradigms like pragmatism, transformative – emancipatory (Tashakkori & Teddlie, 2003). A mixed method design implies the use of both QUAN and QUAL data collection research methods and it particularly occurs in the methods stage of the study (ibid).

3.6 Primary Data Collection

3.6.1 - Quantitative Research Methods

Quantitative research methods are used to confirm hypotheses about a phenomenon. Its main analytical objective is to quantify variation, to predict causal relationships and to describe characteristics of a population or sample (Natasha et al., 2005). Quantitative techniques are often used in analysing responses with a view to identifying significant results and relationships (Galliers, 1992). Hence, this is why questionnaires are used in this context, which is to describe people's behavioural intention to accept eHealth taking into consideration the relevant technology acceptance factors.

3.6.1.1 - Surveys/Questionnaires

Surveys are essentially snapshots of practices, situations or views at a particular point of time taken using questionnaires or structured interviews (see Interview section below)

from which inferences may be made (Galliers, 1992). Questionnaires are the medium of communication between the researcher and the subject. The researcher expresses the questions to which he or she wants to know the answers and the respondents (subjects) answers are conveyed back to the researcher through the questionnaire (Brace, 2008).

Most quantitative social science research methods fall generally in surveys, which are methods of collecting data from a large number of people who represent the population or a random sample of the population (Feagin et al., 1991) revealing associations and causal effects among several factors (Hakim, 1987). Galliers, (1992) also stated that with careful design of surveys, they serve as a good means of looking at much more greater number of variables than in the case with the experimental approaches.

Surveys can therefore provide a reasonable accurate description of real world situations from a variety of viewpoints. Hence, using surveys for this research is necessary to be able to reach a large number of people as well as eliciting the factors that affect technology acceptance which was found to be best understood with the help of surveys. This needed taking into consideration its careful design, which was done by using many different guidelines, making sure they are not biased and constantly connecting each question with the rationale behind the research question of this research. Moreover, by taking into consideration all the previous factors the aim behind using surveys as a data collection method for this research is satisfied. Generally, quantitative methods are somehow inflexible; the advantage of this inflexibility is that it allows for meaningful comparisons of responses across participants and study sites (Natasha et al., 2005). This is why questionnaires are used in this research to find meaningful comparison and correlations among participants responses in the eHealth context.

Surveys also provide transparency and accountability (Hakim, 1987). They can also be reused and repeated to allow for comparison over different groups, times, or places enabling theory testing in an objective manner (Newsted et al., 1998). However, surveys do not provide in-depth understanding of context and history of a given computing phenomena. For example, the researcher did not rely only on quantitative data through distributing a questionnaire to people studied, but gathered data also through interviewing relevant parties for the questionnaire design features as well. In addition, qualitative data allowed the researcher to obtain a complete picture about technology acceptance factors in the eHealth context as well as understanding the feasibility of implementing eHealth.

One of the drawbacks of questionnaires is the unguided result if the questionnaire is boring or too long. Another concern regarding using surveys is that it might provide little insight regarding the causes behind or the processes behind the phenomenon under study (Galliers, 1992).

Therefore, the researcher chose to use surveys for it advantages stated above that will serve the research and to gain more insight, there was a need to conduct interviews with the relevant parties to overcome such concern, these parties were government officials, hospital managers and doctors.

The questionnaire was designed based on several guidelines, books and existing questionnaires from the literature (Jensen et al., 2005; Ackerman et al., 1999; Venkatesh et al., 2003; Holden and Karsh; 2010). The relevant literature design included general privacy attitudes, health information privacy concerns, and technology acceptance factors expressed in previous studies. Most questions were answered using a 5-point Likert scale (strongly agree to strongly disagree). Other questions are straightforward direct questions (yes, no answers) and few open-ended questions with comments. Furthermore, the questions were designed based on several available online surveys on attitudes to Internet privacy, to engagement in e-commerce transactions and to health services in general (Venkatesh et al., 2003, Jensen, 2005; Wilson and Lankton, 2004).

The design of the first part of the questionnaire includes questions on general privacy perceptions when using the Internet for e-commerce transaction like purchasing. This allowed eliciting general attitudes towards privacy concerns (see Appendix A). The design of the second part of the questionnaire is more specific. It examines user attitudes to privacy when engaging in eHealth transactions. This allows for the understanding of specific attitudes that explain privacy concerns towards eHealth acceptance. More specifically, primary data was collected using questionnaires and interviews and secondary data was gathered through existing documentation on e-privacy and technology acceptance models from the literature was undertaken.

3.6.2 Qualitative Research Methods – Interviews

Qualitative research seeks to understand a given research problem from the perspective of the local population it involves. Qualitative research is especially effective in obtaining culturally specific information about the values, opinions, behaviours, and social contexts in particular populations. It also is a means of research about people's lives, lived experiences, as well as about organizational functioning, social movements, cultural phenomenon and interactions between nations (Strauss, Corbin, 1998). The strength here is its ability to provide complex descriptions of how people experience a given research issue as well as its feasibility to be applied in text form. It provides information about the human side of the issue – that is often contradictory to behaviours, beliefs, opinions, emotions, and relationships of individuals. Interviews are

also effective in identifying intangible factors, such as social norms, socioeconomic status, gender roles, ethnicity, and religion, whose role in the research issue may not be readily apparent (Natasha et al., 2005). Furthermore, qualitative methods can be used in substantive areas where there is little or much knowledge known to gain a novel understanding (Stern, 1980).

Several types of qualitative research have been termed to case studies. One of these is ***ethnography*** (field research). Ethnography represents a detailed study of life and activities of a *group of people* by relying on observation of their ways of acting, believing and feeling (Feagin et al., 1991). Although ethnography might seem relevant to this research topic but it still might not obtain and elicit the required understanding of user's perceptions towards privacy because according to the literature reviewed earlier it has been investigated that this topic was best researched using mostly surveys like questionnaires, interviews, focus groups and scenarios. Observations in particular and ethnography as an approach have not been adopted in this research context due to the inability and infeasibility for identifying a particular group of users and the likelihood that this research aim is broader in the sense of understanding the technology acceptance factors towards eHealth from randomly selected citizens giving a chance for a larger scope and a fairly equal chance for anyone to be respondent. This nevertheless doesn't underestimate the power of ethnography that maybe used within other or similar contexts to gather interesting data as well.

Two sociologists Barney Glaser, and Anselm Strauss originally developed ***grounded theory methodology***. Strauss was influenced by interactionist and pragmatist writings. His contributions to the method were a) the need to get out in the field and discover what is really going on, b) the relevance of theory grounded in data to the developed of a discipline and a basis for social action c) the complexity and variability to phenomenon and of human action d) the belief that people are actors who take an active role in responding to problematic situations, e) the realization that persons act on the basis of meaning f) the understanding that meaning is defined and refined through interactions g) a sensitivity to the evolving and unfolding nature of events (process) and h) the awareness on interrelationships among conditions (structures), action (process) and consequences. On the other hand, while Glaser did qualitative analysis he saw that there is a need to make comparisons of data to identify, develop and relate concepts. He also emphasized empirical research in conjunction with theory development (Strauss and Corbin, 1998).

Based on the literature and the study of different research methods, grounded theory approach has given ideas to the researcher in conducting this research. Due to it being relevant for qualitative research as a whole in several ways, but identifying an issue as

a topic for a grounded theory study includes a decision for a research perspective aiming at developing a new theory, where so far the lack of theoretical knowledge exits. It also includes finding the problem that makes it worth studying from a theory development perspective and it includes constructing a phenomenon as a specific research issue (Flick, 2009). However, it has not been adopted as the main method because it wasn't very relevant for the research scope. However, in different circumstances, different cultural settings as well as other technological settings in terms of advancements available as well as probably with actual eHealth services in place it would have served as an interesting way of conducting research within this context.

However, due to its richness it aided clear thinking that provided insights to the researcher to justify the use of the selected methods explained and it helped to decide on the use of Mixed Methods. Due to this and due to the experience taken from reading similar research topics, the author chose to adopt a mix set of methodologies between quantitative in the form of a questionnaire and qualitative in the form of interviews. Generally, some of the data collected through the grounded theory methodology may be quantified as with the census surveys or background information about the persons or objects studied as (Strauss and Corbin, 1998) stated. Data might consist of interviews and observations, which maybe coded and analyzed in statistical manners hence analyzing them quantitatively. Moreover, data may also include documents films and videotapes, and even data that have been quantified for other purposes also as census data (ibid).

Researchers using this approach hope that their work has direct or potential relevance for both academic and non-academic audiences. This is because this methodology takes in great seriousness the words and action of people studied (ibid). By this notion, it has provided insights to decide on the methodology needed to answer the research question. The series of methods mentioned in this chapter show that discovering the impact of attitudes to privacy, trust factors and technology acceptance factors on the acceptance of eHealth is an explicit research question and the research was designed to undertake a pilot study for this aim.

Interviewing as a research method typically involves the researcher asking the questions and receiving the answers from the interviewee (person interviewed). It is very widely used in social research and there are three different types of it. The different types of interviews are structured, semi-structured and unstructured interviews, which depend on the depth extent of the response sought (Robson, 2002). Structured interviews are usually also known as interview surveys in a questionnaire form, yet questionnaire still can be of different structures. Semi-structured interviews allow the interviewee or participant much more flexibility of response and the other extreme is

"depth interviews" known as open ended interviews (Robson, 2002 pp. 270). Interviews are usually one-to-one or face-to-face but they can be done in groups as well. Robson defines in-depth interviews as those where the interviewee is left to express and say whatever they want without prompting form the interviewer. Telephone interviews have also been increasingly used because it saves time and resources (Robson, 2002).

An advantage of interviews is that they allow the researcher the flexibility to probe initial participants' responses that is to ask 'why' or 'how' (Natasha et al., 2005). They also deliver responses that are meaningful and culturally salient to the participant, unanticipated by the researcher and rich and explanatory in nature (ibid). Moreover, benefits of conducting interviews will be to ask people and take their opinions face to face, understand the affectionate side of people with privacy and to understand whether there are plans for enhancing it.

Interviewing can serve as primary means of gathering data. Using interviews in this manner require a careful matching of the goals of the research with the data that they can produce to meet these goals. Used with other methods they can supplement other primary methods or combined with other qualitative methods. In supplementary uses, the interviews often serve as a source of preliminary data in a primarily quantitative study. For example, they can be used to generate survey questionnaires (Morgan, 1997) and (Edmunds, 2000) or to develop the content of applied programs and interventions (Morgan, 1997). Interviews addresses general issue on a topic and respondent's comments often help researchers identify pertinent issues that might otherwise be left out of a survey. Hypotheses generated by interviews frequently lead to further testing using quantitative methods (Edmunds, 2000).

Among the most widely used research tools in social science are group depth interviews, or focus groups. This technique came into vogue after World War II (Stewart et al., 2007). They are used for testing concepts, new products and messages. This method is less structured than survey and tends to be more exploratory as well (Edmunds, 2000).

Focus groups are also effective in eliciting data on the cultural norms of a group and in generating broad overviews of issues of concern to the cultural group or subgroup presented (Natasha et al., 2005). This methodology helps the interviewer to come up with more ideas and more questions to rise according to the responses as well as getting an overall view of the picture as well as valuable ideas and comments from participants.

Focus groups and interviews are not only useful in generating agenda for further studies, but could also serve as a source of follow up data to assist the primary method (Morgan, 1997). Furthermore, interviews in general can be used to further interpret quantitative research (Edmunds, 2000), which is the sequence for methods applied that the researcher chose in this thesis. Firstly, as mentioned earlier the pilot study was used in the form of a survey to collect data, views and opinions, which helped in reshaping the final questionnaire structure. Then the interviews were used as (Morgan, 1997) mentioned to assist, add value and perspective to the primary method results.

One of the disadvantages of interviews, in addition to the limited number of participants is that results are not necessarily representative of the general population from which participants are recruited and should not be considered as such. It main attribute is that it is exploratory with an intention to provide an understanding of motivations and certain concepts (Edmunds, 2000). Another drawback is time limitation for interviewee's and also time needed by the interviewer. The lack of standardization that interviews imply also raises concerns sometimes about its reliability and biases. However they are a rich way of providing material.

In this thesis, interviews were used with a limited number of people as will be described below. Using it as the main method of data collection form Internet users couldn't be applied since it can only be conducted with few numbers of people and for particular types of information due to the time consuming effort it takes from interviewees at first before the interviewer. In summary interviews are not appropriate when large-scale data is needed as defined by (Robson, 2002; Straus and corbin1999).

Part of the interviews conducted during the pilot study was to understand the *other side of the coin.* Interviews were conducted with government officials in the Egyptian Ministry of Health and People (MOHP). Another set of interviews was conducted with the same officials after the pilot study was completed. Finally two hospital managers were interviewed in addition to five doctors that the researcher had a chance to meet when visiting the hospitals were interviewed too.

The conducted interviews' main aim was to understand the situation of eHealth in Egypt, in terms of feasibility, benefits and advantages perceived from eHealth, the disadvantages or barriers to it, privacy issues and insights of how data will be stored, who might have access to it, current automation status in hospitals, automation plan, and IT competence levels for doctors and practitioners (views and perceptions of technology acceptance factors). The aim of conducting interviews was to find correlations between these issues with the acceptance and uptake of eHealth from the feasibility perspective and understanding the managerial views. Another aim was to find

common relationships on technology acceptance factors from survey results and interviews results. Therefore, the research question is tackled in a constructive manner.

In addition, there has been a lack knowledge and limited empirical research within this research topic and context. (Johnson, 2008) stated that the limited number of empirical studies poses a need for systematic research related to Internet privacy using an appropriate sampling strategy and research design, and a need for looking at the feasibility of such concepts.

In this context, interviews where used in complementary with the pilot study and as a follow up source of data collection after obtaining results of the questionnaire. Data translated in factors obtained from this stage of data gathering helped to examine the relationship among the factors in general and the acceptance of eHealth especially since interviews are involved with the relevant parties that deal with sensitive and confidential information like the Health industry and MOHP in Egypt. One-to-one interviews were conducted to collect in-depth information regarding the research underlying concepts. The Interviewed parties involved two MOHP officials, two hospital managers and five doctors.

3.7 Secondary Data Collection

3.6.1 Existing Documentation

Document analysis is another confirmatory method serving as the secondary source of data used in this study. This involved looking at existing documentation including Egyptian government published reports explaining e-government plans and ICT initiatives. Documents also include indicators of the country's Internet usage statistics and population statistics. Internet penetration statistics officially published were also used to calculate the sample size as mentioned earlier. In addition, documents and reports published by the World Health Organization (WHO) were studied especially those on eHealth for the Middle East, or the whole world generally. Also documents published by eHealth organizations such as BCS and NHS Direct were studied. Looking at documents in the field has shown the procedures of how eHealth data is collected and where it goes, which has also helped to uncover the factors that affect eHealth acceptance. Documents also helped understand government expenditures on health and understanding of government strategic plans and directions in ICT. The literature review itself serves as part of the document analysis.

3.8 Data Analysis

3.8.1 Quantitative Data Analysis

The data obtained from the questionnaire were analyzed using a statistical package, SPSS version 19 (the latest version available at that time). Both descriptive and inferential statistics were deduced. Data were analyzed to describe the sample in terms of its demographic characteristics, Internet use patterns and factors affecting technology acceptance. These descriptive statistics, especially frequencies and percentages, are widely used in Internet literature (Brace, 2008; Thomas, 2003). Descriptive statistics are deduced from results of this study to allow for comparisons with existing literature. Regression analysis particularly using (AMOS software add on to SPSS) was conducted to further test the hypotheses of this thesis and further some statistical correlations between demographic and technology acceptance factors and Internet privacy attitudes were deduced.

3.8.2 Reliability and Validity

The original UTAUT model for technology acceptance was derived from the literature and the aim of the empirical research was to test this technology acceptance model along with the added constructs of privacy, Internet experience, satisfaction with medical care and online trust. It was important to verify the reliability and validity of the measures used in the research (Cronbach, 1971; Nunnally, 1978) to draw valid inferences from the research.

Reliability tests the consistency of similar measures to produce similar results (Rosenthal and Rosnow, 1984), whereas the validity of a measurement instrument refers to how well it captures what it is designed to measure (Rosenthal and Rosnow, 1984). This was done using SPSS (version 19), which is a statistical package widely used in quantitative data analysis. The tool calculates both reliability and validity of the measurement instrument.

Cronbach's (alpha) is commonly used as a measure of the internal consistency of reliability. The coefficient normally ranges between 0 and 1. The closer it is to 1.0 the greater the internal consistency (reliability) of the items in the scale. As indicated by Nunnaly, (1978), that constructs having 0.7 and above are to be an acceptable reliability coefficient however lower coefficients (ex: 0.6) are sometimes used in the literature. This indicates a high level of internal consistency or homogeneity among the constructs (Straub, 1989). Furthermore other scholars such as Schuessler (1971) emphasize that 0.6 as an alpha coefficient indicates that a scale is considered to have good reliability.

The overall Alpha for the questionnaire is 0.86 as calculated by SPSS, which indicates very good reliability of the instrument and each construct's reliability coefficient is greater than 0.7 (further details are provided in Chapter 6).

3.8.3 Validity of the Research

Data analysis was followed by the validation phase, which is based on Creswell (2002) that provided suggestions for data validation; the following techniques were adopted in order to validate the data obtained. First, results obtained were compared with the original acceptance model derived from the literature leading to the development of the eHealth acceptance model in Egypt. Then factor analysis that was also conducted with SPSS have shown construct validity where all values are greater than 0.5 (further details are in Appendix C).

The research is validated in different ways:

- Data analysis was done separately for each data collection method.
- The questionnaire sample was chosen to be a good representation of Internet users that was distributed randomly.
- Interviews candidate selection depends on the research question and those selected are those related to the domain and are aware of eHealth. They all work under the MOHP thereby realising the importance of factors discussed and have the knowledge regarding the managerial attempts, plans and feasibility to adopt eHealth as a concept in Egypt.
- The pilot study serves as an important validity checkpoint where it was used to refine the research question and as guidance in the design of the survey and interviews' questions to make sure that they elicit the appropriate information to answer the research question.

3.8.4 Qualitative Data Analysis

For qualitative analysis, data are first transcribed with several attempts that were needed and took place to extract the information relevant to the study. Interview data were written with quotations, or specific evidence (Creswell, 2002) and analyzed manually and with the help of references on qualitative analysis. After doing so, attempts were made to find connections between the data gathered quantitatively and qualitatively. Content analysis is usually used when analyzing qualitative data. It is characterized by its theory driven approach by setting a number of rules to be followed during data analysis (Robson, 2002). The qualitative analysis of the data gathered from interviews led to confirming or denying the effect from both the managerial/practitioner's

side and the user's side (questionnaire participants) of any of the technology acceptance factors that affect behavioural intention to use and implement eHealth.

3.9 Summary

The argument of this research is: there is a relationship between attitudes to privacy and eHealth technology acceptance. In particular for proper investigation of ehealth acceptance as a new technology to be introduced in Egypt it was important to account for technology acceptance factors in addition to online privacy. Attitudes to online privacy, online trust, Internet experience and exposure and other acceptance factors have an impact on behavioural intention that shapes the acceptance of eHealth in Egypt.

The argument is not just that there is a relationship between privacy and eHealth acceptance but also there has been limitation in literature in studying the various acceptance factors and their antecedents that affect the behavioural intention to use new technologies particularly in the eHealth domain. User perceptions and attitudes related to privacy in particular might affect the uptake of Internet technologies such as e-commerce transactions in general and it might affect the uptake of eHealth services generally. The answer to this dilemma was found by interviews, questionnaires, and document analysis.

The research study conducted had two phases. The first phase comprised the pilot study, making amendments to the questionnaire according to the pilot study results and the final version was distributed to randomly selected Internet users. The results obtained from the survey were analysed using SPSS. The second phase of the research study depended on the analyzed and interpreted results obtained from the first phase. It included part of the planned interviews (some interviews were part of the pilot study).

This chapter started by a flashback on the research background, some results reported in the literature showing the use of the same methodological approach in this research. Then the research design, sample and choice of methods were discussed. Finally, the analysis strategy adopted in the research and the research reliability and validity were addressed.

To conclude, the key to good research is not just in choosing the right research method but in asking the right question and picking the most powerful methods for answering the questions given the objectives, research setting and other noticeable factors

(Hamilton, Ives 1992). The next chapter discusses widely used technology acceptance models and behavioral theories found in the literature.

Chapter 4 – Theories, Technology Acceptance Models and Factors Related to eHealth Acceptance.

4.1 Introduction

This chapter discusses the various factors related to the acceptance of technology in general and eHealth in particular arrived at after an extensive investigation of the literature. These factors technology acceptance models constructs particularly used in eHealth, factors from various theories of behavior study and the added factors that were found to be necessary when studying eHealth technology acceptance from the user's side such as: online privacy attitudes concerns, online trust, Internet experience and satisfaction with medical care. Furthermore, this chapter discusses how these factors have an effect on users' attitudes and behaviours towards the acceptance and use of IT and eHealth services.

4.2 A Closer Look at The eHealth Context

In this context, the term eHealth is increasingly used to refer to ''health services and information delivered or enhanced through the Internet and related technologies" (Eysenbach, 2001; Pagliari et al., 2005). Electronic health care records (EHCR) systems, and related concepts such as electronic medical, health, or patient records, refer to health Information systems which electronically record and store individual administrative, medical, or both types of patient information (Burt & Sisk, 2005).

eHealth Definition: Health-related Internet applications delivering a range of content, connectivity, and clinical care are referred to collectively as eHealth. eHealth is promoted as a mechanism to bring growth, cost savings, and process improvement to health care. Health care providers observed initial developments in eHealth mainly from the sidelines due to concerns over risk, liability, and initial expense. However, providers are becoming to accept the situation that patients want to be involved ''as a participant and partner in the flow of information'' relating to their own health care.

Forthcoming sections will explain technology acceptance behaviour theories and models available in literature. Scholars have developed several technology acceptance models that actually help in evaluating and testing how users in health care environments respond to new health-related technologies. These technology acceptance models are specific applications of more generic behavioural change

theories that treat human behavior in terms of attitudes defined as people's evaluation of various aspects of the social world (Olson and Maio, 2003; Hardiker and Granta, 2011; Riegelsberger, et al., 2005; Egea and González, 2011; Wilson and Lankton, 2004; Davis, 1993; Holden and Karsh, 2010).

Holden and Karsh (2010) reviewed the application of the Technology Acceptance Model (TAM), to health care. The studies they reviewed consisted of 16 data sets analyzed in over 20 studies of clinicians using health IT for patient care. These studies varied in samples and settings, health IT studied research models, relationships tested, and construct operationalization (ibid).

In this chapter, the psychological concept of attitude and behaviour will first be introduced and discussed then several established theories like: the theory of reasoned action (Ajzen & Fishbein, 1980) social cognitive theory (Bandura, 1986), and the theory of planned behaviour (Ajzen, 1991) will be addressed, which is needed for a clearer understanding of their strengths and weaknesses. Furthermore, this research discusses the most widely used technology acceptance models: the technology acceptance model (TAM) and the motivational model and how they inter-relate with the previous theories (Davis et al.,1989; Schaper and Pervan, 2007; Wilson and Lankton, 2004; Egea and González, 2011; Hardiker and Granta, 2011; Riegelsberger, et al., 2005; Beekens, 2011; Paine et al., 2007; Patil et. al., 2006).

Finally, an explanation of how these three theories determine the UTAUT model, a specific technology acceptance model that has been applied to eHealth settings will be made and the factors that affect eHealth acceptance will be discussed (Moore and Benbasat, 1991; Hardiker and Granta, 2011; Riegelsberger, et al., 2005) including the concept of privacy concerns and trust and its effect on technology uptake will also be explained (Jensen at al., 2005; Riegelsberger, et al., 2005).

4.3 Attitudes and Its Relation to eHealth

In the exact words of Hardiker and Granta (2011), they stated that one of the most commonly cited definitions presents eHealth as:

'An emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, *an attitude*, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology'. Seeing this

definition it is recognized that attitude is one of the factors that influences the use of ICT in eHealth.

Whilst many research done in Europe, Australia, Canada, U.K. and the U.S. have dealt with attitudes towards eHealth; yet none have examined the impact of privacy attitudes when transacting through the Internet (Liao et al., 2011), as well as their relation or their effect on the acceptance and uptake of eHealth services. Research in the eHealth domain tend to focus on patients sides with particular chronic diseases or on the practitioner's side and their use of IT, ICT or technology in general for eHealth in order to understand the benefits and risk towards eHealth management and use. The understanding of the citizen's feelings, perceptions and factors affecting eHealth acceptance has not been sufficiently considered particularly in Egypt. This study represents the first step in the eHealth initiative direction.

Attitudes refer to the way in which people evaluate the various aspects of the social world surrounding them according to which they behave. The notion of attitude has a long tradition in psychological research and Information Sciences like HCI (Johnson, 2008; Beekens, 2011; Kobsa, 2007; Paine et al., 2007). Allport (1935) defined an attitude as 'a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related' (p. 810). Also attitude was described as 'a relatively enduring organization of beliefs, feelings and behavioral tendencies towards socially significant objects, groups, events or symbols. A general feeling or evaluation (positive or negative) about some person, object or issue', (Hogg and Vaughan, 1998).

A key principle in attitude research is the existence of an *attitude-behavior* link, where attitudes guide behavior. Attitudes in general can influence behaviour through two different mechanisms. First, intentions derived from attitudes can predict behaviour, provided that one can rationally think about these attitudes (Beekens, 2011). Second, some theories assume that people do not engage in deliberate thoughts, and attitudes influence behaviour purely by shaping the perception and interpretation of the situation where in this case human behavior is more natural (Beekens, 2011; Davis, 1989, 1993; Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Furthermore, perceptions towards situations affect ones attitudes, which then influences ones behaviour (Kobsa, 2007; Beekens, 2011; Wilson and Lankton, 2004).

Several established theories like the Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB) and Social Cognitive Theory (SCT) have focused on the ways in which careful and deliberate thoughts can be given to attitudes, thereby influencing people's behaviour (Ajzen and Fishbein; Bandura, 1986). These theories serve as the

underlying concepts behind the emergence of technology acceptance models (TAM) and their various extensions like the UTAUT (Davis, 1989, 1993; Davis & Venkatesh, 1996; Davis et al., 1989), which will be discussed and explained in details in forthcoming sections of this chapter.

Another key principal linked to attitude and eHealth privacy in particular is psychological privacy. It concerns one's ability to control affective and cognitive inputs and outputs, to think and form attitudes, beliefs or values, and the right to determine with whom and under what circumstances one will share thoughts and feelings or reveal intimate information (Parrott et al., 1989). A number of factors including personality based privacy attitudes, privacy uncertainty, and various trust-establishing factors have been identified that all play a role in the privacy calculus of Internet users (Kobsa 2007). These theories and factors will be described in the next sections starting with the theory of reasoned action (Ajzen & Fishbein, 1980).

4.4 Theory of Reasoned Action (TRA)

The theory of reasoned action (TRA) and theory of planned behavior (TPB) declare that behaviour is influenced by behavioural intention and that intention is determined by attitude. Attitude usually mediates between belief and intention, although belief can also have a direct effect on intention (Corbitt et al., 2003). (Fishbein & Ajzen, 1980) found that the core assumption underlying the theory of reasoned action is that the decision to engage in behaviour follows from a *"rational process in which behavioural options are considered, consequences or outcomes of each are evaluated, and a decision is reached to act or not to act"* (Baron et al., 2009).

The concept of ***behavioural intention*** is a key element in TRA that is the most important determinant of an individual's behaviour (Ajzen & Fishbein, 1980; Baron et al., 2009; Corbitt et al., 2003). Motivation theories in general focus on the intentions of people and the underlying factors and mechanisms behind the formation of these intentions. The motivation theories specify that people's intention to behave in a specific way, depends on the interaction of: (a) the expectation of that behavior regarding its outcome, and (b) the attractiveness of that outcome (Hale et al., 2003).

TRA consists of three factors (shown in figure 4.1), the *attitudes* of people, their *subjective norms*, and their specific *intentions*, which influence behaviour respectively. Hale et al. (2003) formulates an attitude as "an affected response toward performing some behaviour and not toward some generalized attitude object".

The second factor in TRA is the subjective norm (SN). In the exact words of (Ajzen & Fishbein, 1980), Subjective Norm is defined as "the opinion of someone's significant other regarding one's specific behaviour that is to be executed". In simple terms, SN is how people around you that you trust, deal with, or those that influence your lives like (family members, friends, colleagues, doctors, teachers etc.) might influence your behaviour by their opinion, past experiences, guidance or recommendations.

The third factor in TRA is Behaviour Intention (BI). Together, a person's attitude plus noticeable other's SN generate a behavioural intention for that person in order to execute that behavior (or not). In summary, the theory of reasoned action and theory of planned behavior theorize that behaviour is influenced by intention to behave and intention is determined by the actor's attitude towards the behaviour (Corbitt et al., 2003).

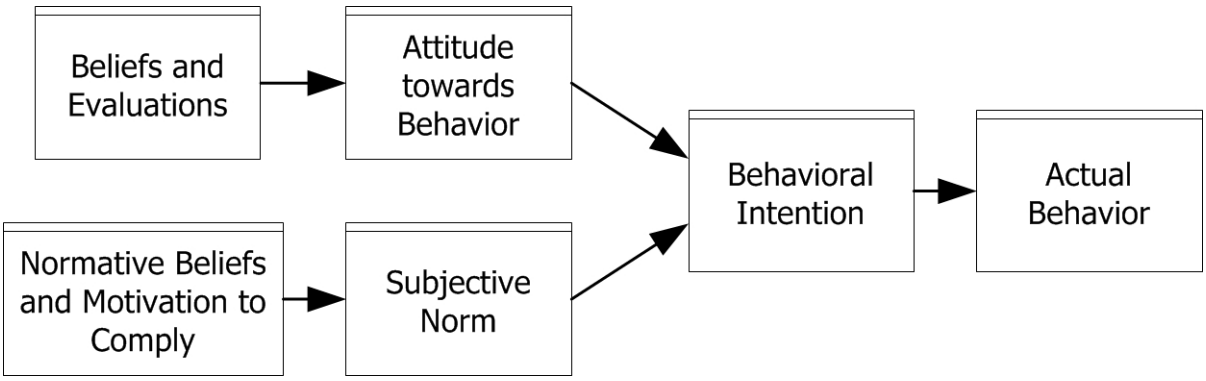


Figure 4.1 Theory of Reasoned Action Model (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975)

Importantly, TRA is originally based upon the aim to explain strong-willed behaviour. TRA scope of behaviors therefore excludes a wide range of behaviors that are for instance impulsive, spontaneous, the result of cravings, or simply mindless because their performance may not be completely voluntary or because the engagement into these behaviors is not out of conscious intention of the actor to do so (Beekens, 2011). Also, TRA excludes behaviors that require specific skills, unique resources, or the cooperation of other people in order to perform (Beekens, 2011; Ajzen & Fishbein, 1980). In this research study, users need specific skills, experiences and base of the understating of Internet technologies to be able to have clear behavioural intention on the acceptance of eHealth.

4.5 Theory of Planned Behaviour (TPB)

The theory of planned behaviour is an extension of the TRA suggesting that individuals in addition to attitudes toward a specific behaviour and the subjective norms about that behaviour also consider their ability to perform a certain behaviour which is the concept of self-efficacy, (Compeau and Higgins, 1995). TPB was put forward as an improvement of TRA – to also account for circumstances under which an individual has less than complete control over his behavior. In that respect, Ajzen et al., (1985) relied on Bandura's (1986) concept of self-efficacy to introduce the notion of "perceived behavioural control".

Perceived behavioural control refers to how easy or difficult the performance of a given behavior is likely to be in the eye of the beholder (Bandura, 1986). PBC is also known as facilitating conditions in the unified theory of acceptance and actual use of technology that will be discussed below. Therefore researchers included self-efficacy in TPB via the notion of perceived behavioral control.

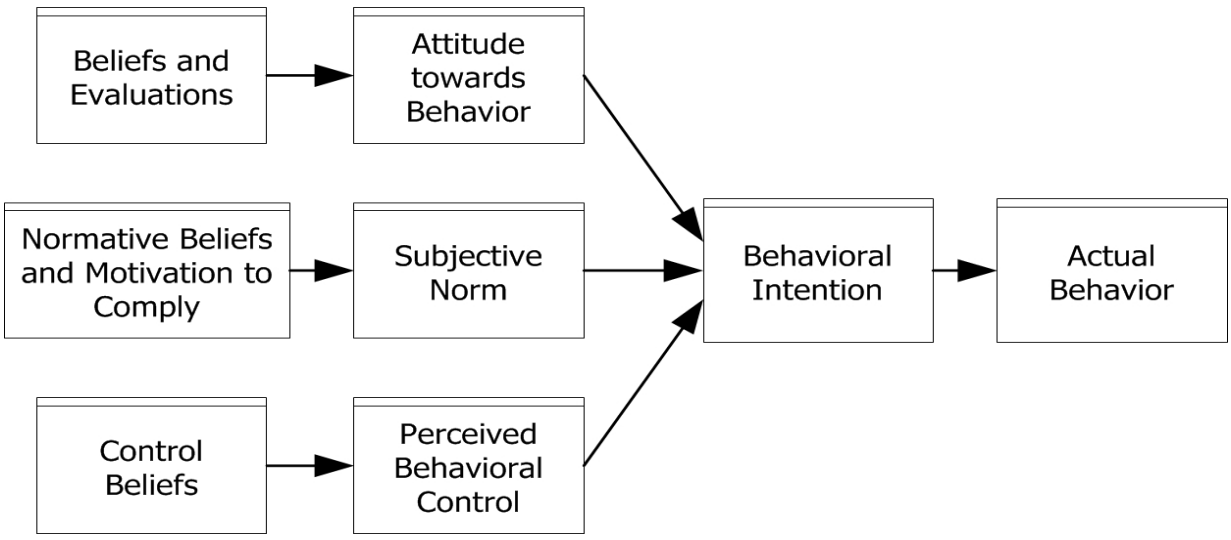


Figure 4.2 Theory of planned Behavior Model (TPB)

A positive attitude towards perceived behavioural control most likely yields a stronger intention to actually perform the behavior (Ajzen, 1988). Perceived behavioural control can influence behaviour directly or indirectly through behavioural intentions: the direct path reflects the actual control that an individual has over performing the behaviour; the indirect path is based on the assumption that perceived behavioral control has

motivational implications for behavioural intentions (Ajzen, 1988).

In summary, TPB deals with the antecedents of subjective norms, attitude and perceived behavioural control in order to predict and explain actual behaviour.

4.6 Social Cognitive Theory (SCT)

The social cognitive theory places social learning as the main focus in human behaviour (Bandura, 1986). SCT can be described as a theory that assumes a person's thoughts, feelings, and the social environment may influence the way in which a person learns (Bandura, et al., 1977). Furthermore, SCT is often considered a very powerful theory of human behavior (Beekens, 2011).

As seen in figure 4.2, the SCT underlying notion is based on a three-way interaction set. This means that individual behaviour is presumed to be the outcome of a set of interactions between three factors: one's feelings (P), one's cognitions (B), and the way in which someone observes the world (E) (Bandura, et al., 1977). The behaviour, individual differences, and situational possibilities all have a mutual influence and affection on each other.

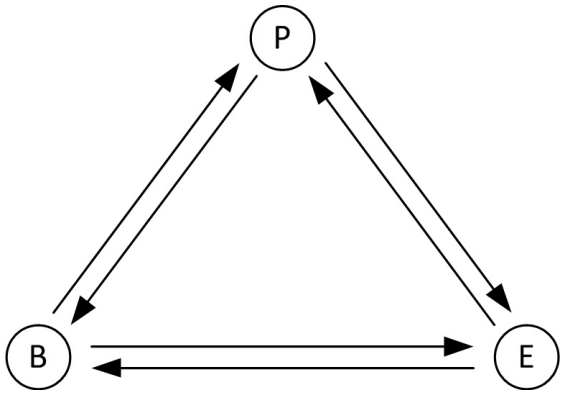


Figure 4.3- Social Cognitive Theory (SCT) by Bandura, 1986

The three factors are not necessarily to be of equal strength; some relations can be stronger than others and also do not necessarily all steer behavior at the same time (Beekens, 2011). It can take some time before the effect of one relationship starts to have an impact on the other factor. The relationships are in both directions, i.e. people on the one hand influence their environment but on the other hand are also influenced by the same environment that they create (Beekens, 2011).

Bandura (1986) emphasizes that observational learning refers to “the capacity to learn by observation which enables people to expand their knowledge and skills on the basis of information exhibited and authored by others”. This constitutes five preconditions: first, the learner must observe the model performing the behaviour; second, the learner must accurately perceive the model’s behaviour; third, the learner must remember that behaviour; fourth, the learner has to possess the skills to perform the behaviour him-/herself; and finally, the learner must have the feeling that the behaviour is being reinforced (ibid). Summarizing, SCT is a solid model for explaining human learning processes, empirically validated and widely accepted (Beekens, 2011).

4.7 Technology Acceptance Models: Their Constructs and Use in eHealth

Several researchers used different types of technology acceptance models to model user’s acceptance of certain technological systems. The most widely used technology acceptance model across various contexts is the Fred D. Davis “Technology Acceptance Model”. This is due to its important attribute of being a generic model that can be applied to any context using ICT. Scholars have extended this model with extra constructs or merged it with other technology acceptance models. The sections following will discuss the original TAM by Fred D. Davis and some other well known extensions of it used in the eHealth context.

Gallant, et al., (2010) emphasized that in order to design eHealth that meets the needs and wants of users, technology adoption research and user-centered design (UCD) principles should be considered. The major theories and explanatory models of individual technology acceptance, like TAM (Davis et al., 1989), TAM2 (Venkatesh and Davis, 2000), or UTAUT (Venkatesh et al., 2003), argue that usage intentions serve as a reasonable proxy for actual usage behaviour. TAM was developed in the 1980’s, in light of concern that workers were not using the IT made available to them (Holden and Karsh, 2010).

Extant literature reveals the widespread use of TAM to understand the user acceptance of Internet-based applications and services, such as email, web sites, or online shopping (Egea and González, 2011). Moreover, Wilson and Lankton (2004) stated that both TAM and the motivational model have been applied successfully to predict technology acceptance outside health care domains, and TAM has been used successfully to model physicians’ acceptance of telemedicine technology.

More recently, an increasing number of studies have applied TAM (Davis et al., 1989)

and extensions of this model (e.g., Venkatesh, et al., 2003) to explain the adoption and utilization of health IT systems and services (Yarbrough and Smith, 2007; Holden and Karsh, 2010). Examples of such studies include those focusing on telemedicine (Chau & Hu, 2002), eHealth applications (Chismar and Wiley-Patton, 2002; Wilson and Lankton, 2004), modeling patients acceptance of provider delivered eHealth by (Wilson and Lankton, 2004), and examining patient centered factors that affect acceptance for venous thrombosis services (Beekens, 2011). Furthermore, Moores (2012) stated that a number of studies have applied TAM to the adoption and acceptance of IT in healthcare. Moores, (2012) stated that these studies were in terms of proving the reliability of TAM, and with additional constructs that take into account the particular context of health IT. For instance, willingness to try new technology (personal innovativeness) positively influences the intention to use a patient–physician web portal, while resistance to change negatively impacts the intention to use a computerized physician order entry system. Service level is also an important determinant of Perceived Usefulness and Perceived ease of use, either in terms of the general reliability, stability, and responsiveness of the system, or more specific issues, such as physical access to computers and access rights to the system (ibid).

TAM is a theory that has changed over time and evolved to an updated TAM2, and more recently and impressively effort was done to unify the IT acceptance literature, which resulted in the Unified Theory of Acceptance and Use of Technology (UTAUT) that has obvious resemblance with TAM. The UTAUT was the model used for technology acceptance in this thesis due it being a promising theory where early tests of UTAUT explained an impressive 70% of the variance in BI and about 50% in actual use (Holden and Karsh, 2010).

Particular TAM relationships were consistently found to be significant, whereas others were inconsistent. Several key relationships were infrequently assessed. Findings show that TAM predicts a considerable portion of the use or acceptance of health IT, but that the theory may benefit from several additions and modifications (Holden and Karsh 2010). Apart from the improved study quality, standardization, and theoretically motivated additions to the model, an important future direction for TAM is to adapt the model specifically to the eHealth care context, using beliefs elicitation methods (ibid).

(Wilson and Lankton, 2004) stated that the history of information technology (IT) system development is full with projects that were rejected by intended users because developers did include or address key factors underlying acceptance (Wilson and Lankton, 2004). For this reason, it is important that health care providers are able to effectively model patients' acceptance of eHealth.

The main aim of this research arises from this point. As emphasized by many studies

that it is important to identify main factors that might affect technology acceptance from the literature and in turn test these factors in the research context. For a successful eHealth initiative to be established in Egypt there is a need to understand the factors that might affect acceptance of eHealth from the users point of view. Testing of these factors may result in considerations and recommendations for eHealth providers in the country where the initiative might not be successful if such factors were not accounted for.

Models are useful in predicting which patients will use eHealth and in understanding what factors influence their decisions. Models also can aid in designing and evaluating the ability of specific eHealth applications, such as online formularies, to meet the needs of patients in general as well as the needs of specific patient categories, such as diabetic patients, patients with certain chronic illnesses or general health information seekers users. This research focuses on general Internet users, which are in turn general health users. Respecting privacy issues as well, this research did not focus on patients with particular diseases as not to scare them from participating in the study especially that the concept of eHealth is not popular in Egypt.

In summary, developed from the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980), TAM posits that two fundamental beliefs, perceived usefulness (PU) and perceived ease of use (PEOU), determine an individual's attitude towards the use, behavioural intention (BI), and actual usage of information systems (Davis et al., 1989). Since the introduction of this model, TAM and its extensions (specifically the UTAUT) has provided clear evidences of its robustness, parsimony, and predictive power in studies over a wide range of technological and information systems (Davis and Venkatesh, 1996; Davis et al., 1989; Holden and Karsh, 2010; Wilson and Lankton, 2004, 2012; Or and Karsh, 2009; Egea and González, 2011).

4.7.1 - TAM by F.D. Davis

In the exact words of Davis (1993) 'The Technology Acceptance Model (TAM) specifies the causal relationships between systems design features, perceived usefulness, perceived ease of use, attitude toward using, and actual usage behaviour'. Linking the notion to attitudes, he stated that attitude theory from psychology provides the rationale for hypothesized model relationships.

TAM postulates that user adoption of a new Information System is determined by their intention to use the system, which in turn is determined by their beliefs about the system. As adopted from TRA and TPB there are behavioral beliefs, normative beliefs

and control beliefs. These are an individual's perceptions about specific positive/negative outcomes of performing the target behavior, specific groups or people who encourage or discourage the behaviour, and specific factors or circumstances that make the behaviour easier or more difficult (Holden and Karsh, 2010).

In online technology adoption, the TAM highlights the importance of trust, usefulness, and ease of use from the user's point of view (Gallant et al., 2010). Davis (1993) proposed a specific modification of TRA for the domain of ICT: the technology acceptance model (TAM). TAM is an intention-based model that explains/predicts the eventual usage of new software or technology by the end-user from the moment of introduction until several weeks afterwards (Beekens, 2011).

Furthermore, according to Davis et al. (1989), the goal of TAM is to 'provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified'. To meet these requirements, though, Davis (1986, 1989, 1993) made some important modifications to the original TRA-TPB framework (Beekens, 2011). As much as 10% of the space allocated to Information Systems Publications is claimed by TAM research and it accounts for 30 - 40% of IT acceptance, despite its relative simplicity (Holden and Karsh, 2010).

As shown below in figure 4.4 (TAM), attitude is an individual's evaluative judgment of the target behaviour on some dimension (e.g., good/bad, harmful/beneficial, pleasant/unpleasant) (Holden and Karsh, 2010). It is hypothesized that a user's overall attitude towards using a given system is a major determinant of whether he or she actually uses it. Attitude in turn is affected by two beliefs perceived usefulness and perceived ease of use. Perceived ease of use as a causal effect on perceived usefulness, and system design features directly influence perceived usefulness and perceived ease of use. System design features have an indirect influence on attitude toward using and actual usage behavior through their direct effect on perceived usefulness and perceived ease of use (Davis, 1993).

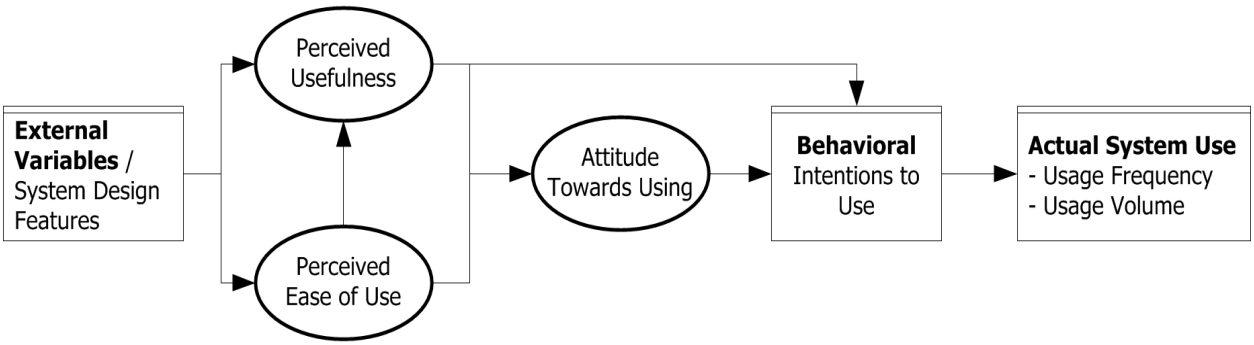


Figure 4.4 - TAM by Davis (1993)

TAM is based on principles adopted from Fishbein and Ajzen's attitude paradigm from psychology (Davis, 1993). Fishbein and Ajzen's distinguish between two attitude constructs: 1) attitude towards the object and attitude toward the behaviour. It has been shown though that attitude towards behaviour has a stronger relation to a specified behaviour which is used in TAM as attitude towards the system which was adapted to be defined as the degree of evaluative affect that an individual associates with using his target system in his or her job (Davis, 1993).

Davis (1986, 1989) removed many of the initial TRA attitude measures. Davis removed the subjective norm component as a determinant of behavioral intentions, because of the seemingly uncertain theoretical and psychometric status of this component. TAM posits that only two beliefs — perceived usefulness and perceived ease of use — predict an individual's attitude toward using IT, and he removed the expectancy belief component. This was mainly done to transform the TRA to a model capable of explaining and predicting IT user acceptance as can be seen from Figure 4.4.

Perceived Usefulness (PU)

The factor perceived usefulness (PU) relates to the degree to which a person believes that a technological system will actually increase his or her performance (Davis, 1986). Perceived usefulness consistently stands out as the main driver of technology adoption in organizational settings (Egea and González, 2011; Davis, 1993).

For example, perceived usefulness has been proposed as a major determinant of physicians' acceptance of health information systems, suggesting that medical professionals hold a pragmatic view of technology (Egea and González, 2011). Thus, physicians' acceptance of health IT systems such as EHCR should be highly dependent on the instrumental benefits (e.g., performance and efficiency improvements) associated with the adoption decision (ibid).

Perceived ease of use (PEOU)

The factor perceived ease of use (PEOU) refers to the degree to which a person believes that using a specific technological system will be free of effort (Davis, 1986). It is defined as ‘‘the degree to which the prospective user expects the target system to be free of effort”, which is the second determinant of usage intentions in TAM (Davis, 1993).

The rationale behind the relationship of PEOU influencing PU is that – according to the theory – the perceived usefulness of a technological system is larger when it is easier to use. Several empirical studies have indeed found evidence for this relationship between the intention to use and PU, and generated evidence that the effect of PEOU operates through PU (Davis, 1986; Andriessen, 2003; Beekens, 2011; Wilson and Lankton, 2004).

Intention to use

The major theories and explanatory models of individual technology acceptance, like TAM (Davis et al., 1989), TAM2 (Venkatesh & Davis, 2000), or UTAUT (Venkatesh et al., 2003), argue that usage intentions act as a proxy for actual usage behaviour (Chau and Hu, 2002, Egea and González, 2011). Viewed as the ‘‘conative component of attitude” (Fishbein and Ajzen, 1980), behavioural intention is regarded as the key determinant of behaviour, it is an individual’s motivation or willingness to exert effort to perform the target behaviour (Ajzen and Fishbein, 1980; Egea and González, 2011; Wilson and Lankton, 2004; Davis, 1993; Holden and Karsh, 2010).

In previous TAM research, intentions mediate the effects of other potential antecedents of actual usage behavior (Davis et al., 1989; Venkatesh et al., 2003, Egea and González, 2011). Using behavioural intention as the dependent variable, instead of actual usage, is useful to examine the acceptance of technological systems at an early stage (Chau and Hu, 2002; Sheppard et al., 1988; Wu, Wang and Lin, 2005; Egea and González, 2011; Wilson and Lankton, 2004; Beekens, 2011). Due to the notion of eHealth being a new technology that hasn’t been adopted in Egypt yet, the dependent variable in this research is behavioural intention, which has been justified from the literature to measure the acceptance of a new technology.

4.7.3 – The Motivational Model Integrated with TAM

Wilson and Lankton, (2004) conducted research to model patients acceptance of provider delivered eHealth and they focused their research on two prominent models of IT acceptance: the technology acceptance model (TAM) and the motivational model

(MM).

As mentioned before, TAM extends the theory of reasoned action (TRA) by proposing that an individual's perceptions of a technology's usefulness (PU) and perceived ease of use (PEOU) are key contributors to behavioral intention (BI**)** to use the technology (Davis, 1993).

On the other hand, the motivational model proposes that intrinsic motivation (IM) and extrinsic motivation (EM) are key in determining BI. In technology acceptance research, *BI* is typically used as the *dependent variable* in place of actual usage as mentioned in the previous section. Moreover, BI is available for measurement at the same time as other constructs in acceptance models and is considered to be an accurate predictor of future usage (Wilson and Lankton, 2004).

For this integrated model to evolve Wilson and Lankton (2004) tested the effectiveness of three models: Two well-known models of IT acceptance and a recently introduced approach that integrates the two in explaining patients' behavioural intention to use provider-delivered eHealth. They also tested five theoretically important characteristics of patients to assess whether these are significant antecedents to the models.

As development and testing of the two models have progressed, it has become clear that the PU construct of TAM and the EM construct of the motivational model measure the same underlying construct. Due to this, some researchers developed an integrated model that uses IM, PEOU, and a unitary PU-EM construct to predict BI depicted (see Figure 4.5 below). Their initial test of this model resulted in better-fit statistics than either TAM or the motivational model alone. Wilson and Lankton (2004) replicated these tests in an eHealth context.

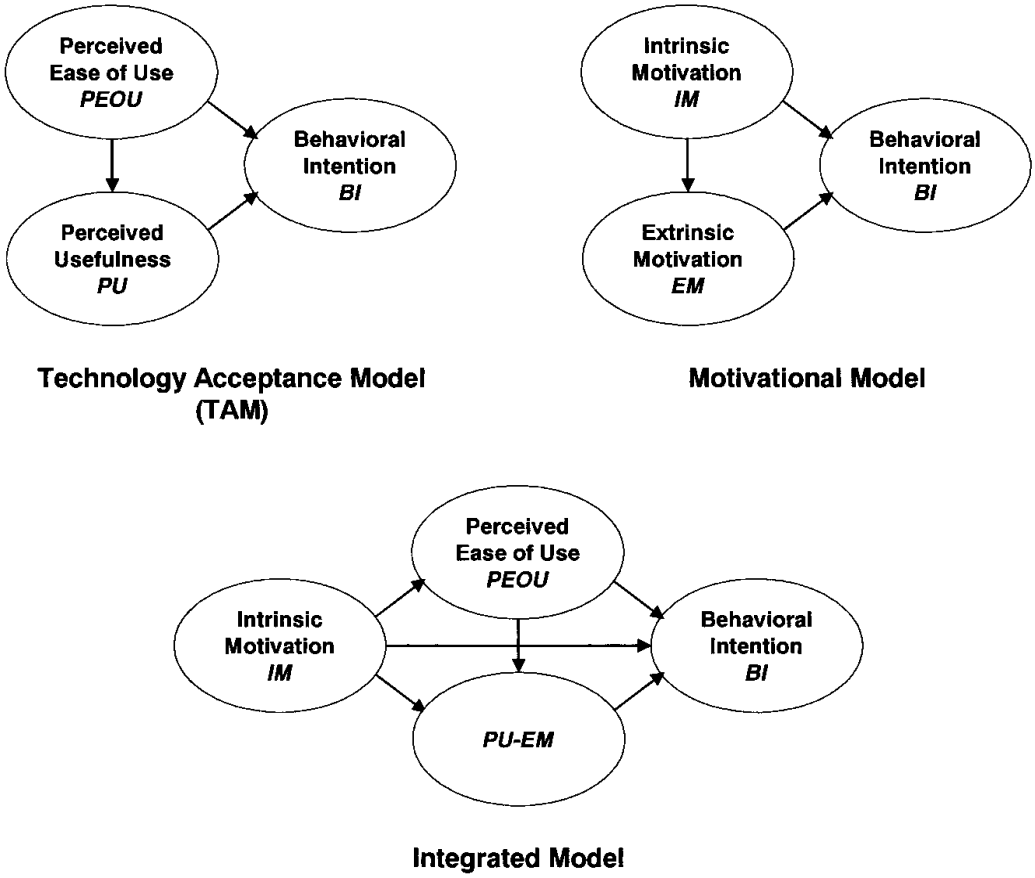


Figure 4.5 Three models of technology acceptance (Wilson & Lankton, 2004)

4.7.4 Other TAM extensions in eHealth.

Also, an extended version of the technology acceptance model (TAM) is applied to study hospital Web sites, one specific area of eHealth. According to (Gallant et al., 2010), noted that there are five significant factors from TAM research which are identified as logically related to eHealth sites from the user's perspective: usefulness, ease of use, trust, privacy, and personalization. They conducted a study for guiding the development of effective patient-centered eHealth where all five factors emerged in the data analysis of 30 participants using a hospital Web site.

Research using TAM in e-Commerce has found that trust, privacy, and user perceptions of technology are central elements of online technology adoption (Gefen et al., 2003; Gefen and Straub, 2003; Gallant et al., 2010; Hardiker and Granta, 2011), although no research has incorporated all these factors together in a single study which is the major contribution of this thesis.

4.7.5 Unified Theory of Acceptance and Use of Technology (UTAUT)

Based on eight well-known models in the field of IT acceptance research, Venkatesh et al., (2003) proposed a unified model, called the Unified Theory of Acceptance and Use of Technology (UTAUT), which integrates elements across the eight models. The eight models consist of Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Social Cognitive Theory (SCT), Motivational Model (MM), Theory of Planned Behavior (TPB), the Combined TAM and TPB (C-TAM-TPB), Innovation Diffusion Theory (IDT) and Model of PC Utilization (MPCU).

The UTAUT is a theory with so much resemblance to TAM. The UTAUT incorporates PU into the performance expectancy construct, PEOU into effort expectancy, and SN into social influence (Holden and Karsh, 2010). New to the UTAUT, but not to IT acceptance research generally, is the modeling of facilitating conditions as one determinant of BI. UTAUT is a new but promising theory; early tests of UTAUT explained an impressive 70% of the variance in BI and about 50% in actual use (Holden and Karsh, 2010; Cheng et al., 2011).

Furthermore, although the UTAUT model is relatively new, it has inspired researchers to try its suitability in different contexts (Or and Karsh, 2009). Although Venkatesh and Davis (2000) among others have extended TAM to explain perceived usefulness and usage intentions in terms of social influence and cognitive processes (Beekens, 2011), however, the most ambitious attempt, is the Unified Theory of Acceptance and Use of Technology (as seen below in Figure 4.6.) which was developed by Venkatesh et al. (2003) as mentioned in (Beekens, 2011; Or and Karsh, 2009; Holden and Karsh, 2010; Cheng et al., 2011).

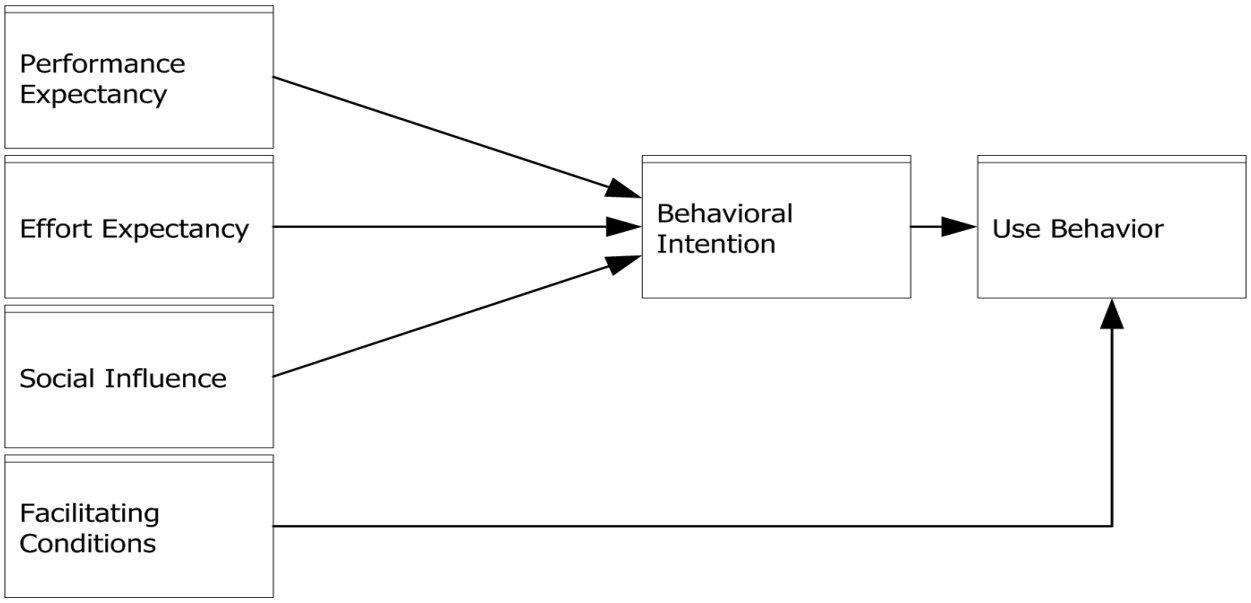


Figure 4.6 UTAUT (Venkatesh et al., 2003)

The Unified Theory of Acceptance and Use of Technology (UTAUT) is based on four core determinants of intention and usage. There are performance expectancy, effort expectancy, social influence and facilitating conditions. The first factor, *performance expectancy PE*, is based on the notion of perceived usefulness in the TAM (Davis, 1986, 1989; Venkatesh et al., 2003) which is an individual's perception that using an IT system will enhance job performance in other words it refers to the degree to which an individual user believes that using a specific IT-supported product or service may be helpful in improving performance (Beekens, 2011; Cheng et al., 2011; Venkatesh et al., 2003). Scholars such a Beekens, (2011) have combined it with four specific moderators (gender, age, experience and voluntariness of use) that may influence behavioral intention and observable use behaviour.

Prior research shows that the performance expectancy construct has a strong and positive influence on behavioural intention (Chang et al., 2007; Davis, 1989; Davis, et al., 1992; Taylor & Todd, 1995; Venkatesh & Davis, 2000; Venkatesh et al., 2003; Beekens, 2011; Holden and Karsh, 2010).

The second factor, *Effort Expectancy (EE),* refers to the degree to which technology is easy to use, and shows similarities with the perceived ease of use construct in TAM (Venkatesh & Davis, 2000; Venkatesh et al., 2003; Beekens, 2011; Holden and Karsh, 2010). Specifically defined, it is an individual's perception that using an IT system will be free of effort (Venkatesh et al., 2003). Most studies support the significant influence of effort expectancy on behavioural intention to use (Agarwal & Prasad, 2000; Chang et

al., 2007; Davis, 1989; Moore & Benbasat, 1991; Schaper & Pervan, 2007; Holden and Karsh, 2010; Cheng et al., 2011).

Third factor from Bandura's (1986) social cognitive theory, *Social Influence (SI)* is defined as the degree to which an individual perceives that significant others believe that he or she should use the new system (Venkatesh et al., 2003). It is also defined as an individual's perception of the degree to which important other people approve or disapprove of the target behavior (Holden and Karsh, 2010). In the TRA (Fishbein & Ajzen, 1975) as well as in the TPB (Ajzen et al., 1985), social influence is a direct determinant of behavioural intention and is represented in terms of a subjective norm (Venkatesh et al., 2003).

The more significant others value a certain behaviour, the longer the likelihood that those people exert an influence over the individual, and the larger the chance that they also influence the individual's behavioural intention (Beekens, 2011). It seems reasonable that also for patients in health care settings, such a positive relation exists between social influence and behavioural intention where in this case SI can be from one's doctor, family members etc.

The fourth factor, *Facilitating Conditions (FC)*, refers to the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system (Venkatesh et al., 2003; Beekens, 2011; Cheng et al., 2011), or in other words it is an individual's perception of how easy or difficult it will be to perform the target behaviour (self-efficacy), of factors that impede or facilitate the behavior (facilitating conditions), or of the amount of control that one has over performing the behaviour (controllability) (Holden and Karsh, 2010). Facilitating conditions is also similar to the perceived behavioral control factor (PBC) from the TPB (holden and Karsh, 2010).

After its introduction, the UTAUT model was tested and applied to several technologies, such as online bulletin boards and instant messengers. However, most of these studies simply applied the UTAUT model to different technologies in a single country (Im et al., 2011). Most studies applying the UTAUT in the eHealth domain focused on the acceptance of physicians and only very few and limited were on patient acceptance. Even those that studied patient acceptance were examining patients with specific chronic illnesses and one study studied patient acceptance in using venous thrombosis devices to help them manage their health care (Beekens, 2011). Moderating variables examined with UTAUT model, have found that experience, gender, and age as most significant to moderate acceptance (Wilson and Lankton, 2004; Holden and Karsh, 2010; Im et al., 2011; Beekens, 2011).

The UTAUT model has also been applied to the study of technology acceptance among

health care professionals (Aggelidis and Chatzoglou, 2009; Kijsanayotine at al., 2009; Schaper & Pervan, 2007; Or et al., 2010), for instance showing that physicians still are reluctant to use and accept ICT's without proper understanding why or how they make their decision (Schaper & Pervan, 2007; Chismar and Wiley-Patton, 2003; Western et al., 2001).

Prior research on UTAUT generally reports a positive effect of performance expectancy on behavioral intention to use a given technology (Venkatesh, et al., 2003; Or and Karsh, 2009; Beekens, 2011). Also, those studies that specifically investigated the role of technology acceptance in health care settings show this positive relation between performance expectancy and behavioural intention among health care professionals (Chau & Hu, 2002; Chismar & Wiley-Patton, 2003; Hu et al., 1999). There is no reason to assume that this effect of performance expectancy on behavioural intentions will be different for patients in general.

The UTAUT has been chosen as the model to test eHealth acceptance in Egypt due to its prior application in eHealth settings and its suitability that has been demonstrated in previous work (Wilson and Lankton, 2004; Beekens, 2011; Holden and Karsh, 2010) as emphasized previously. Furthermore, this research extends UTAUT with factors that might be necessary for eHealth acceptance and adaptability to cultural need in Egypt. This will be discussed in details in the next section and in Chapter 5.

4.8 Factors Affecting Pubic Engagement in eHealth and Potential Antecedents.

In many studies of IT acceptance, antecedent factors relating to the individual, organization, and systems have been shown to significantly affect IM, PEOU, PU, and EM (Wilson and Lankton, 2004). Since these factors have temporal precedence to system acceptance and occur independently of the model constructs, they may be applied to predict users' tendencies toward technology acceptance before the technology is actually implemented (ibid).

Assuming that predictions involving eHealth acceptance can be made from antecedent characteristics of patients, it will be important for health care providers to examine these factors prior to making decisions regarding eHealth design and deployment (Wilson and Lankton, 2004; Wu et al., 2012; Hardiker and Granta, 2011). Findings from a study by Wilson and Lankton (2004) identified several characteristics of patients who tend to accept eHealth, which may be useful both in guiding the overall decision of whether to deploy eHealth or not.

Patients who are satisfied with their current medical care, those who prefer to seek information about their health care, and those who are already dependent on the Internet tend to accept eHealth (ibid).

Beekens, (2011) also emphasized that several other factors must be taken into account to properly study the technology acceptance of patients. One of these factors is the perceived quality of care (QOCP), which is the quality of care that these patients receive when they use an ICT-mediated self-management service (Beekens, 2011). Previous studies reveal a positive correlation between the quality of health care offered by a self-management service and self-reported obedience, which may positively influence behavioural intention to use a health care technology (ibid).

Another important factor is socio-economic status. In practice, socio-economic status has proven to be a powerful predictor of people's use of health care (Hardiker and Granta, 2011) meaning that it can influence patients' behavioural intention to use the eHealth technology. Socio-economic status can generally be measured by three individual factors: the current salary of an individual, the highest completed education, and/or the current employment of a person (Beekens, 2011). However, research from other domains suggested that effects on behavioural intention may not be that straightforward, and that additional factors need to be included to ensure a better fit with the reality of patients as end-users of technology (Beekens, 2011). Demographics in general as well as socio-demographics have been obtained from the respondents in this study for descriptive statistics and possible correlations.

Hardiker and Granta (2011) conducted a literature review research to investigate the factors that affect public engagement in eHealth. After their investigation of 440 items via CINAHL, 1226 via EMBASE and 1153 via MEDLINE and obtaining six additional literature reviews for post-analysis cross-validation of findings, they came up with two sets of themes. The first set was concerned about the type of eHealth service (or resource) featured in the articles. There are four main types of eHealth services, these include: **health information on the Internet** (featured in 27 articles); **custom- made online health information**, *e.g.* CDs, kiosks, portals (7 articles); **online support**, *e.g.* coaching, mailing lists and online communities (12 articles); and **teleHealth** including remote consultation, monitoring and reporting (4 articles). Furthermore, they identified the second set that concerned barriers and facilitators. One hundred unique themes emerged which they condensed into five main themes: **Characteristics of users**, *e.g.* literacy levels; **Technological issues**, *e.g.* security and privacy; **Characteristics of eHealth services**, *e.g.* content issues; **Social aspects of use** *e.g.* shared experience; and **eHealth services in use,** *e.g.* fit with everyday life.

Other researchers, Wu et al., (2012) aimed to investigate trust and privacy concerns

related to the willingness to provide personal information online under the influence of cross-cultural effects. They investigated the relationships among the content of online privacy statements, consumer trust, privacy concerns, and the moderating effect of different cultural backgrounds of the respondents. Their study came up with four constructs that were related with the content of privacy policies: willingness to provide personal information; privacy concern, trust and privacy policy. Furthermore, Liu et al., (2004) proposed and tested a theoretical model that considers an individual's perceptions of privacy and how it relates to his or her behavioural intention to make an online transaction (see below Figure 4.7).

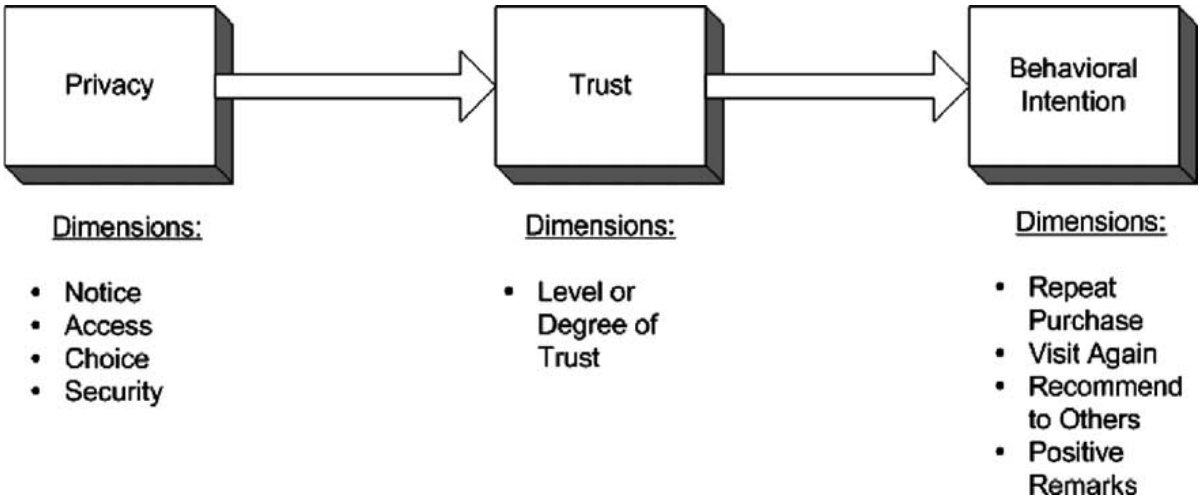


Figure 4.7 Privacy- Trust- Behavioural-Intention models, by C. Liu et al., (2004)

All themes were compared to the existing research constructs found from the literature review and such attempts made it interesting to test such factors influence on eHealth acceptance in Egypt. In this research study privacy, trust, satisfaction with medical care and Internet experience and exposure factors were used in addition to the UTAUT original constructs to measure acceptance of eHealth. According to knowledge, this is the first attempt to actually include these constructs in technology acceptance models particularly in the UTAUT in the particular context of eHealth.

4.9 - Research Survey Constructs Development.

As mentioned earlier, the theory of reasoned action (TRA) has been used extensively as a basis for predicting behavioural intentions and/or behaviors. The TRA contends that behavioural intentions are antecedents to a specific behaviour of an individual. More specifically, an individual's attitudes and perceptions will influence that individual's actions when he or she believes that certain behaviour will be linked to a specific outcome. Furthermore, subjective norms, social pressures to perform or not perform a particular behavior influence behavioural intentions, determined by an individual's positive or negative evaluation of it. Based on the same logic, an internet user's perceptions and attitudes regarding privacy and trust might influence his or her attitudes toward online transactions and in turn, shape his or her behavioural intentions to participate in an online business activity. Accordingly, trust and privacy concerns were included as factors in the research conceptual model serving as an extension of the UTAUT model.

TAM originators reasoned that the key to increasing use was to first increase acceptance of IT, which could be assessed by asking individuals about their future intentions to use the IT. Knowing the factors that shaped one's intentions would allow organizations to account for those factors in order to promote acceptance, and thus increase the IT use in a specific context (Holden and Karsh 2010). By the same notion, this research exerted efforts to investigate the factors underlying technology acceptance within the context of eHealth in accordance to the Egyptian culture. This research focused on studies that focus on health IT use or acceptance (i.e. behavioural intention to use) in addition to research on attitudes and perceptions to privacy, online trust and general eHealth and e-commerce research.

Extant literature review has revealed that TAM and the UTAUT models are the most relevant to be used in the eHealth context due to its embeddedness with technology and due to the fact that various research and empirical studies used TAM and UTAUT in the context of eHealth mainly to model users behaviour and intention to use certain eHealth systems or applications as well as adding some constructs or variables that reflect trust as an example.

However, the TAM is not a model developed specifically for the health care context. If used TAM is used in its generic form, it may not capture or it may contradict some of the unique contextual features of computerized health care delivery (ibid). Accordingly, it was determined to use the UTAUT due to its promising use and implication in the eHealth context mentioned earlier. The UTAUT model takes facilitating conditions into consideration as well as social Influence, which are the added constructs to the original

TAM, which in turn influence a user's behavioural intention as justified by various researches that it may reflect cultural differences.

4.10 - Summary

This chapter presented a summary on technology acceptance models and theories used in both the IT and eHealth contexts. The objectives of this chapter was to: (1) to undertake a comprehensive, critical review of studies of TAM and UTAUT with respect to health IT, with particular focus on how, if at all, those studies account for the health care context; (2) to judge the usefulness of the UTAUT and its worth as a theory of health IT acceptance and use; (3) to propose modifications and opportunities of change and extension to the theories in an effort to improve its usefulness to researchers, designers, and health care decision makers in Egypt. Accordingly, this research uses the UTAUT constructs along with additional antecedent factors relevant to the eHealth context. The influence of these factors on the acceptance and uptake of eHealth in Egypt are tested and thereby this serves as a starting point for the eHealth initiative in Egypt.

The next chapter discusses the constructs underlying the questionnaire in details and the development of the proposed research UTAUT extension model with the added factors of online privacy, online trust, satisfaction with medical care and Internet experience and exposure. The next chapter also discusses the hypotheses established used to test the relationships in the model.

Chapter 5 –The Proposed Research Model (UTAUT extension)

The previous chapter presented and discussed the technology acceptance models and theories widely used in the IT domain and ends with a summary on the technology acceptance model adopted for this research which is the UTAUT. It also highlighted the use of these models in the eHealth domain. This chapter provides a detailed explanation of the UTUAT model use in the eHealth context. It highlights its uses in similar work within the context that have adopted similar technology acceptance models. It then presents the model developed within the current study as an extension of the original UTAUT as well as addressing the importance of adding constructs to the original UTAUT and the consideration of antecedents' effects.

5.1 Introduction

The e-government initiative and deployment has been established in Egypt for the past eight to ten years and small steps towards the eHealth initiative have been made during the past year. Specifically, the Ministry of Health and Population (MOHP) has taken some steps towards the automation in some public hospitals and clinicians now have access to an online system providing scientific medical information that helps them in medical diagnosis and research. This study therefore is a point of interest for the Egyptian MOHP regarding the launching of public eHealth services that was emphasized by the MOHP official (IS/IT head and consultant). A tele-health project was introduced a year ago. This project aimed at linking patients in Upper Egypt and public hospitals' physicians in Cairo. This was necessary due to the lack of sufficient health care services and specialties in Upper Egypt, which caused people to travel long hours to access appropriate health care in the capital for major specializations. The telemedicine project was described as successful since it facilitated communication between both parties, saving time and saving travel expenses. Unfortunately the project came to a halt because of insufficient funds during the revolution and political status in Egypt for the past year and a half.

The main research aim is to examine the factors related to eHealth acceptance, which would be an advantage for the public by overcoming the barriers related to eHealth explained previously. A key to the adoption of any new technology and in this context (eHealth) is to first understand the factors that affect acceptance of such technologies. Understanding of these factors and their significance with acceptance maybe accounted

for by health care service providers and designers or else funds invested in these technologies could be just a waste. In precise, constructs for the questionnaire survey of this research were determined according to the UTAUT in consideration with other underlying theories and technology acceptance models that are expected to affect the acceptance of eHealth.

The survey questionnaire adapts to the culture and level of awareness towards eHealth in Egypt. The introduction of eHealth services hasn't taken place in Egypt yet therefore people have limited experience towards eHealth technologies. People's level of eHealth awareness in Egypt cannot be ignored because eHealth is not established yet in the country as mentioned by MOHP government officials (please see Chapter 3 section 3.4, 3.5.2 and Chapter 4 sections 4.1 and 4.2). Accordingly, it was important for the survey questions to reflect the meaning of constructs in details. The main aim was therefore to test the impact of Internet users' attitudes to online of privacy (in a broad sense), online trust, Internet experience and exposure in addition to factors pertaining to the UTAUT and how these factors may affect users acceptance of eHealth technology in Egypt.

At an earlier stage of this study, the social influence construct of the UTAUT was not going to be included due to its limited inclusion in previous research from a user's perspective. Another reason was also mainly because of the lack of eHealth services offered officially in the country. Since social influence is also defined as an individual's perception of the degree to which important other people approve or disapprove of the target behaviour (Holden and Karsh, 2010), therefore it was seen difficult to ask respondents if they were influenced by others to use eHealth (which is new in Egypt). Holden and Karsh, (2010) emphasize that it is still unclear on how the eHealth contexts can adapt to using technology acceptance models, for example who are the people that might be of *social influence* for clinicians or patients? However, it was determined not to do so after finding that social influence could be by any important others such as one's doctor for example. Hence, users might be influenced by medical care providers **"**important other people" to accept or not accept eHealth.

(Holden and Karsh, 2010) also conducted a review of technology acceptance studies in eHealth of non-physicians including nurses, technicians, pharmacists, physicians assistants and physiotherapists. However, this focus may be insufficient to understand patient acceptance of eHealth and to further guide its implementation (ibid). Moreover, few organizational variables, fewer human technology interaction or environmental variables were tested and no task or social variables were tested or examined (Or and Karsh, 2009; Holden and Karsh, 2010). Particularly the UTAUT resulted due to an effort to unify the IT acceptance literature (Holden and Karsh, 2010).

The purpose of using the UTAUT in this research was to have a principled set of

variables from which to predict eHealth acceptance and use with justification from similar research such as (Or. et al., 2010; Holden and Karsh, 2006; Beekens, 2011; Holden and Karsh, 2010). Studied variables from literature are not the only possible predictors of eHealth acceptance as emphasized and also recommended by researchers for further extensions in the context of eHealth acceptance (Beekens, 2011; Wilson and Lankton, 2006). This in turn has encouraged the development of this research UTAUT extension model, however the operationalization of constructs had to be done with care.

Moreover, evidence has shown that the UTAUT demonstrated a substantial improvement over the other acceptance models and explained 69% of the variance in behavioural intention, which is the most common indicator of acceptance. Behavioural intention is the measure of acceptance in this present study, and the reasons are as follows:

- The variable has been widely used to measure individuals' acceptance of (health) technology;
- Individuals' formation of an intention to perform a behaviour may mean that the individual has accepted the behavior; and
- Behavioral intention considerably predicts actual behavior, such as using a technology (Or et al., 2010; Holden and Karsh, 2010).

To the best of knowledge, there hasn't been research that adopted the technology acceptance model to general Internet users (patients side) in health care with inclusion of privacy attitudes and concerns, trust and other factors. It seems reasonable that the UTAUT predictions to a great extent generalize to patients (Beekens 2011) but some modifications must be made to the original model to make it more applicable to the situation of users in Egypt that hasn't been exposed to eHealth services in the country due to their inexistence as mentioned before in Chapter1. However, people in Egypt have been using the Internet in various aspects and using e-government services extensively as it saves times, saves money as well in terms of transportation when doing the errand, less frustrating, less bureaucracy, and less traffic.

5.2 Constructs and Measurements for the UTAUT

A questionnaire was created with items validated from prior research adapted to the technologies and eHealth context studied. These factors serve as independent variables that pertain to the UTAUT and some added variables that impact the dependent variable, which is the behavioural intention BI (measure of acceptance). The

added variables approach in health care settings has been praised by many researchers, which provide better understanding of the factors that might cause behavioural intention or actual use of health IT and helps to understand the causes of other variables in models such as performance expectancy and effort expectancy (Holden and Karsh, 2010; Wilson and Lankton, 2004, 2007; Beekens, 2011; Or and Karsh, 2009; Kowiltawakul, 2008; Im et al., 2011; Hardiker and Granta, 2011; Hu et al., 1999; Liang et al., 2003). The added variable approach has also been adopted in general technology acceptance models research (Venkatesh et al., 2000, 2003; Moore and Benbasat, 1999). Advantages of this approach are that it may help researchers and designers understand health IT use and acceptance enduring the benefits in developing general IT theory (Holden and Karsh, 2010).

Researchers emphasize that the general health care context differs from that of industries where technology acceptance models originated (ibid). In different contexts differences in variables needed to understand acceptance may not only exist but also the meanings of some variables such as PE and EE maybe very different due to the absence of health IT-specific definitions of and measures of usefulness. This also applies to definitions of social influence in health care when compared to other studies (ibid).

Based on the UTAUT, the research model includes independent variables which are the determinants associated with acceptance and perceived effective use. The independent variables are the original UTAUT model factors: 1) performance expectancy, 2) effort expectancy, 3) social influence, and 4) facilitating conditions. The added independent variables include 1) general attitudes to privacy 2) satisfaction with medical care, 3) online trust, and 4) Internet experience and exposure. Details are further described in the following sections, and the research hypotheses are established to test the model constructs.

(Holden and Karsh, 2010) concluded that study variables differed in how they were conceptualized. For example perceived usefulness was defined as heath IT use leading to enhancements or gains in job performance. They further noted that no study used a broader definition of usefulness in spite of the fact that health IT might be useful in also making performance easier, more satisfying, increasing efficiency, and lowering costs, improving quality and safety of care and more. Definitions based on Davis's original TAM focused on personal performance, those based on the UTAUT did not. The same applies with the other constructs such as effort expectancy or perceived ease of use, which was sometimes defined as free of mental effort, or just ease of use.

When dealing with the eHealth context, challenges are faced in terms of construct operationalization. (Davis et al., 1993; Holden and Karsh, 2010; Or and Karsh, 2009)

suggested that there is a need for alternative operationalization of technology acceptance constructs to be examined to determine the robustness of the technology acceptance models. The variability in measures places a challenge on the degree to which different UTAUT tests are actually similar to compare, (Holden and Karsh, 2010). This has been justified for both versions whether TAM or UTAUT, mainly because they are newly used in the eHealth context, therefore finding studies that have adapted them to health in general wasn't easy. Therefore most studies adapted the items used in the original UTAUT to the context studied. Which was the same approach followed for this research.

Interesting meanings and definitions of constructs were found and their phrasing was checked in the pilot study conducted. This is also inline with (Holden and Karsh, 2010), who stated that technology acceptance models investigators differently interpreted constructs defined the same way, for example some work state that there are different meanings for effort expectancy for individuals versus the organizations. Furthermore the notion of performance expectancy (usefulness) that focuses on personal productivity maybe not be meaningful and sufficient in health care. Some studies use measure of increased quality of care, and similar health care specific measures of usefulness (Hu et al., 1999; Liang et al., 2003).

Operationalization of the studied technology acceptance constructs (original UTAUT) therefore had to be based on two dominant definitions of Health IT that has been developed by (Holden and Karsh, 2010) which they based on the convergence between international definitions of health IT and health/medical informatics. These two definitions are:

"The application of information processing involving both computer hardware and software that deals with storage, retrieval, sharing and use of health care information, data and knowledge for communication and decision making".

"The knowledge, skills and tools which enable information to be collected, managed, used and shared to support the delivery of health care and promote health".

5.2.1 - Performance Expectancy (PE)

Performance expectancy suggests that users will be more likely to accept the technology if they believe that the technology is useful as it can convey health benefits or facilitate health self-management (Or. et al., 2010; Wilson and Lankton 2004; Holden and Karsh 2010; Venkatesh et al., 2003).

Hardiker and Granta, (2011) defined a theme that typically includes usability, usefulness and fit with everyday life. This theme is consistent with the definition of PE (Venkatesh et al., 2003).

Email was reported as the most frequently used resource and the most desired by those without access to health services. Some authors recommended that information should be easy-to-find, well organized, concise and understandable, and expressed the need for education around searching (Wilson and Lankton, 2004).

Users often use eHealth sites to gain information about a health condition or disease and increase their knowledge about health topics. This suggests that users who feel that they have relatively little knowledge about caring for their own health will tend to accept provider-delivered eHealth (Wilson and Lankton, 2004).

Also, with today's raised awareness towards the environment elements like contaminated natural resources and food, trend for better health and the "eat healthy" trend. Thus, it is likely that users will want to increase their health care knowledge through eHealth services in general and this in turn will increase performance expectancy which might affect BI. This dimension is also a part of the theme "Characteristics of users" defined by (Hardiker and Granta, 2011) as seen above.

Measurement: PE is measured by the usefulness of eHealth services, further explained by health care knowledge and level of motivation or degree of engagement in eHealth are the dimensions used which are justified by (Hardiker and Granta, 2011; Wilson and Lankton, 2004; Beekens, 2011 and Venkatesh et al., 2003; Venkatesh and Davis, 2000; Holden and Karsh, 2010).

This suggests **Hypothesis 1:**

H1: PE might have an effect on acceptance of eHealth (BI).

For example: 1) users who feel that there is usefulness of eHealth services, 2) users with higher perceived health knowledge and 3) users with experiences or beliefs that information can make a difference to one's health indicate higher performance expectancy and thus might have higher acceptance of eHealth (higher BI).

The questionnaire used in this study employed a five point Likert scale (strongly agree to strongly disagree). Questions used to measure PE are:

Table 5.1 – PE Measurement Items

Questions Measuring Performance Expectancy
Providing my health information to Internet pharmacies will enhance my effectiveness in managing my healthcare.
Emailing doctors for health advice will be useful in managing my health care.
Taking prescriptions from doctors online will be useful (saves time, increase effectiveness).
Using personal health records services (such as MS Health Vault or Google Health) for storing health records will support managing my heath care.
Online access by hospitals to a summary of my health information without my consent if intended for medical reasons for my benefit will support critical aspects of my health care.
Accessibility of my electronic health information to all local hospitals will be useful.

5.2.2 Effort Expectancy (EE)

Effort expectancy (EE) in the UTAUT refers to "the degree to which a participant believes that using the self-management technology would be free of effort" (Venkatesh et al., 2003). eHealth acceptance studies supported that EE positively predicted acceptance (the effect was also found to be mediated by PE). This suggests that patients are more likely to accept eHealth services and perceive the technology as useful if they feel that the technology is easy to use (Or. et al., 2010; Wilson and Lankton 2004; Holden and Karsh 2010; Beekens F.C, 2011; Venkatesh et al., 2003).

Furthermore, the characteristics of eHealth services theme focuses principally on the content of eHealth services (content issues). Content is an important factor in terms of quantity, relevance, comprehensibility, reliability and impartiality, navigability, flexibility and tailoring (Hardiker and Granta, 2011) which in turn match the definition of effort expectancy. Content issues have been justified by many researchers regarding their positive influence towards the acceptance of eHealth services. General characteristics of eHealth content helped to explain the EE construct in the eHealth domain in this study.

Measurement: EE is measured by the perception that eHealth technology is easy to use originally adopted form (Venkatesh and Davis, 2000; Venkateshet al., 2003) and with elaboration from researchers in the eHealth context (Hardiker and Granta, 2011; Wilson and Lankton, 2004; Beekens, 2011; Holden and Karsh, 2010).

This suggests **Hypothesis 2:**

H2: EE might have an effect on the acceptance of eHealth (BI).

Questions used to measure EE are:

Table 5.2 - EE Measurement Items

Questions Measuring Effort Expectancy
It will be easy to book appointments online.
It will be easier to access medical lab test results online.
Buying medicine online will be free of effort.
I will find it easy to use an official site of the Ministry of Health for browsing health Information.
Using an official telephone service that may help answer questions or diagnose my health condition will easy and free of effort.

5.2.3 Facilitating Conditions (FC)

The success of any effort to execute a specific behaviour lies on an individual's efforts, and his/her control over skills, the required information, his/her abilities, willpower, presence of mind and the availability of resources (Holden and Karsh, 2010) known as Perceived behavioural control (PBC).

PBC pertains to facilitating conditions (FC) in the UTAUT, which reflects individuals' perceptions of internal constraints (i.e., self-confidence in his or her ability to perform a given behaviour) and external constraints (i.e., the availability of resources, such as technical support, needed to perform the behaviour) on the behaviour of interest, such as eHealth acceptance and use.

Beekens, (2011), indicated his unawareness of any previous studies that have examined the impact of perceived behavioural control on eHealth patient users acceptance. However, studies of healthcare professionals and studies outside of healthcare have shown that perceived behavioural control significantly predicts acceptance and use of information technology (Or. et al., 2010). Examples of FC factors are: skills to use the Internet, availability of the Internet and modern electronic equipment, Pcs/Laptops as resources, and their ease of use adopted from (Beekens, 2011) and are justified by (Venkatesh and Davis, 2000; Venkatesh et al., 2003).

Measurement: FC is measured by availability of resources and skills to perform a behaviour (intention to use eHealth). FC measures were originally adopted form (Venkatesh et al., 2003) with further explanation and elaboration from (Hardiker and Granta, 2011; Wilson and Lankton, 2004; Holden and Karsh, 2010). This suggests **Hypothesis 3**:

H3: Facilitating conditions might have an effect on user's BI (acceptance of eHealth services).

Questions used to measure FC are:

Table 5.3 - FC Measurement Items

Questions Measuring Facilitating Conditions
Ease of use of Digital Camera
Ease of use of Digital Alarm
Ease of use of DVD
Ease of use of Laptop
Ease of use of Printer
Ease of use of Scanner
Internet access from Home
Internet access from Work
Internet access from Internet cafe
I have the skills to use the Internet for various purposes.
The Internet as a resource is available and cheap.
I think I would be able and have the skills to identify trustworthy medical web sites when searching for medical information.

5.2.4 Social Influence (SI) and Satisfaction with Medical Care Constructs

Normative beliefs also known as Subjective norm (SN) from SCT and SI in UTAUT refer to the perceived behavioural expectations of such important referent individuals or groups as the person's spouse, family, friends, and (depending on the population and behaviour studied) teacher, doctor, supervisor, or coworkers.

In the context of this present study, SI refers to the user's perceptions that people who are important to him or her think he or she should use the technology (Or et al., 2010). For the definition to be applied to the eHealth context therefore it is defined as the

degree to which an individual perceives that important others believe he or she should use health IT.

Although the impacts of SI on acceptance (BI) are not always consistent, evidence has shown that the factor has been a significant determinant of acceptance within the Information Systems literature as well as in research studying acceptance among healthcare providers, such as physicians. In such studies SI is exerted from colleagues or managers, however when addressing the patient side SI could be from one's doctor as stated earlier in this section. Furthermore, the effect of social influence on intention has been shown to be significant and also non-significant, especially studies in professionals with high autonomy such as physicians, (Yu-Shan et al., 2011; Or et al., 2012).

Research shows that the more satisfied a patient is with medical care; the more likely he or she is to follow the physician's advice. Dissatisfaction with medical care can motivate patients to change physicians or leave a health plan (Wilson and Lankton, 2004). This implies that social influence has an antecedent, which is satisfaction with medical care. These findings suggest that users (patients) who are more satisfied with their current medical care will tend to listen more to their doctor's advice and additional offerings, including eHealth (ibid). However such studies didn't actually test the relationship between SI and BI from the user's side (health care receiver), most studies (if SI was included) were in the context of physicians' acceptance.

In this research social influence measurement were adopted from (Venkatesh and Davis, 2000; Venkatesh et al., 2003). Also was further elaborated on from others (Flynna et al., 2009; Wilson and Lankton 2004; Holden and Karsh, 2010). This has lead to **Hypothesis 4a**:

H4a: Social Influence might have an effect on the acceptance of eHealth services (BI).

Questions used to measure SI are:

Table 5.4 - SI Measurement Items

Questions Measuring Social Influence
My doctor influences my decisions regarding my health care management and I follow his recommendations in using eHealth.
I trust my doctor a great deal to make medical decisions that are in my best interests ad would follow his advice in using eHealth services.

The two items measuring satisfaction with medical care were adopted from (Marshal et al., 1993) also used by Wilson and Lankton (2012), were modified to fit the context. This suggest **Hypothesis 4b:**

H4b: Satisfaction with medical care might have an effect on SI, which will affect BI.

Questions used to measure Satisfaction with Medial Care are:

Table 5.5 - Satisfaction with Medical Care Measurement Items

Questions Measuring Satisfaction with Medical Care
I am extremely satisfied with my doctor and medical care I receive.
My doctor answers my questions extremely well.

5.2.5 Behavioural Intention (BI)

Behavioural Intention (BI) refers to the strength of an individual's intention to perform behaviour. It is the most common measure of acceptance (Holden and Karsh, 2010), and is the one used in this present study as the dependent variable. Previous studies have shown that behavioural intention predicted usage behaviour, such as using a technology (Venkatesh and Davis, 2000; Venkatesh et al., 2003).

Using eHealth services is one way to receive health information since the technologies offers getting prompt lab test results and up-to-date health and treatment knowledge (Or. et al., 2010; Wilson and Lankton, 2004; YaŞin and Özen, 2011). Therefore, users who want to receive more information about their condition or treatments means that they accept the technology indicating their BI. The availability of eHealth services also saves people time and travel expenses to see physicians for just renewing prescriptions, submitting lab results or X-rays. Hence, Health information seeking preference was used to explain BI as in (Or et al., 2010; Or and Karsh, 2009; Wilson and Lankton, 2004).

Measurements of BI were adopted from (Venkatesh et al., 2003) and were elaborated on by (Or and Karsh, 2009; Holden and Karsh, 2010; Wu et al., 2011) used in the eHealth context.

The current work hypothesizes that both EE and PE influence behavioural intentions as shown in hypotheses 1 and 2 respectively (discussed above). Also EE is posited to predict PE, as detailed in the following hypotheses:

H5: Higher levels of EE lead to higher levels of PE.

H1: PE might have an effect on BI (as discussed previously).

H2: EE might have an effect on BI (as discussed previously).

Questions used to measure Behavioural Intention are:

Table 5.6 - BI Measurement Items

Questions Measuring Behavioural Intention
I would be happy to access medical lab test results online.
I would be happy to buy medicine online.
I would be happy to use an official online health service that may help in directing my health condition to the specialised doctor.
I would be happy to use an official online health service that may help answering questions about my medical condition, provide recommendations or provide a medical diagnosis.
I would be happy to book appointments online.
I am happy to receive health advice and prescriptions from my doctor Online if possible.

5.3 Added Constructs/Antecedent Factors

Antecedent factors investigation was recommended by researchers for a better, clearer and in-depth understanding of influences on the acceptance of eHealth. Some interesting examples include measures of users/patients health care involvement, normative influences, socioeconomic status, satisfaction with medical care, health care knowledge, privacy concerns and trust.

The following section demonstrates and discusses the added factors that were examined in this research. These include attitudes to online privacy, online trust, exposure to computer/Internet/health technology (Internet experience and exposure) and satisfaction with medical care.

5.3.1 Attitudes to Online Privacy

The concept of *privacy* is not absolute. Privacy is both subjective and changeable because it varies according to the views and customs of each society (Marshall and Miller, 2005). In addition, other concepts such as confidentiality, secrecy, professional privilege and security are often used interchangeably with 'privacy', particularly with respect to the protection of personal information (ibid). From a research perspective, a case-based study finds privacy and confidentiality primary patient concerns in communicating personal health issues electronically (Bernhardt et al., 2002).

Central to the definition of privacy is the issue of privacy concern (Westin, 1967). The concept of privacy concern has been regularly applied to the Internet over the past recent years (e.g. Cranor, 1999). The majority of studies that have examined privacy concerns have been conducted using a survey methodology, where users' attitudes toward privacy are assessed by asking them to indicate on a fixed scale the degree to which they agree with specific privacy statements (ibid).

In this study the aim was to understand the impact of online privacy attitudes and concerns on eHealth acceptance, specifically how users would respond in a situation when personal information is collected this was to determine respondents general attitudes to online privacy which is also inline and following approaches of (Ackerman et al., 1999; Paine et al., 2007)

In the pilot study of this research, respondents to the survey were asked to state their privacy concerns in free hand text and to state the data that they mostly think is confidential. Health information was one of the information types that they think are most confidential and sensitive in addition to photos, financial income, credit card and

family members' information. Accordingly items used to measure privacy concerns were employed based on their comments and some questions were reformulated as "degree of comfort towards providing personal information etc." instead of just an agreement on some statements. The aim was to study privacy and examine it as general attitudes towards online privacy.

Harper and Singleton described how the use of an unprompted survey can provide the most accurate data. For example, where respondents are not provided with any response options and are simply asked to list issues of concern to them. In this research unprompted responses were limited to the pilot study, which in addition gave insight on the types of questions that can be included in the final questionnaire.

This research adopted similar items to measure attitudes to privacy used by (Ackerman et al., 1999; Smith et al., 1996; Gefen at al., 2010; Jensen at al., 2005) who are well known scholars in the privacy field. Reminding the reader of the importance of the pilot study in this phase, which concluded the rewording of some items and excluding others based on the understanding of the questions by the respondents in the pilot. Some items were newly developed and others were modified and elaborated on.

Due to the limited opportunity for open responses in the previous surveys conducted in this area, the present study aims to explore Internet users' perceptions and attitudes of privacy by asking them within certain contexts, which is personal information provision online and health information provision on the other hand.

Measurements of privacy attitudes and concerns were adopted from (Jensen, 2005; Liao et al., 2011) and with effort to be consistent and inclusive with others like (Paine et al., 2007; Sillence et al., 2007; Bernhardt et al., 2002; Gefen et al., 2003; Gefen and Straub, 2003; McKnight et al., 2002; Bansal et al., 2010; Liu et al., 2004; Kobsa, 2007; Ackerman et al., 1999; Smith et al., 1996).

People's attitudes to online privacy might therefore affect BI directly and also might affect performance expectancy; lastly privacy attitudes might affect the level of trust. Hence, **Hypothesis 6** was established, broken down to:

H6a: Attitudes to online privacy might have an effect on the acceptance of eHealth services (BI).

H6b: There is a negative relationship between attitudes to privacy and online trust.

H6c: attitudes to privacy might negatively affect PE.

Questions used to measure attitudes to privacy are:

Table 5.7 - Attitudes to online privacy measurement items

Question used to Measure attitudes to online Privacy
How quickly after meeting people on the internet do you begin sharing personal details about yourself?
I provide correct personal Information on the Internet
I share personal details about myself with people I meet on the Internet
I am concerned when providing my credit card details when buying something online.
I provide my personal information if the site is trustworthy
I provide my personal Information for a service but sometimes Im not sure if I can trust the site
I provide my income information when I need a certain service

5.3.2 Online Trust

Trust has many shades of meaning. It is a complex social phenomenon that reflects technological, behavioural, social, psychological and organizational aspects of interactions among various human and non-human agents (Liu et al., 2004). Trust may also be associated with an individual's belief in an organization based upon the organization's norms, regulations, policies, and procedures. This may be reflected in a user's confidence in an organization offering e-commerce transactions. By the same notion, trust can be reflected in a user's confidence in using health websites or eHealth services in general (Riegelsberger, et al., 2005; Liu et al., 2005). Taking trust online, it might have an effect on the acceptance of eHealth services. Moreover, if users trust transacting online they might in turn accept eHealth technologies therefore have higher behaviour intentions.

Trust develops gradually as people interact with each other and therefore it is also important to study the effects of trust on transaction decisions and other behavioral outcomes (Gefen et al., 2008). At the beginning trust is important to be established however it diminishes over time when the person uses the technology more and more. This is particularly in cases when people learn more about those with whom they interact, and they start relying more on the usefulness of the interaction than trust on forming their behavioural intentions (Gefen et al., 2008). New users, as well as

experienced ones, choose whether to use the Web site based on both trust and the usefulness and ease of use consideration. New users, therefore rely more on trust, whereas more experienced users rely more on perceived usefulness when making transaction decisions. In other words, the importance of trust as a key consideration decreases with experience (ibid). In this research since eHealth technologies are new to Egypt, trust was therefore seen as an essential factor that needs to be included within the technology acceptance of eHealth services.

In the HCI trust debate, user trust in e-commerce has been given considerable attention in research. This is due to the increasing number of technologies supporting transactions over distance and replacing traditional forms of interaction (Johnson, 2008). Gefen et al., (2008) have emphasized that a future research agenda should focus on developing a theory or set of theories that identify the IT item constructs to increase trust in e-commerce and how these constructs can be integrated into technology adoption models, such as the TPB. This agenda serves as evidence and justification of this research proposed extended technology acceptance model with trust and privacy factors.

Trust intention may positively influence participation behaviour or in other words trust in online transaction may influence technology acceptance depicted by BI. Findings from his research suggest that people are more likely to purchase (transact) on the Internet if they perceive a high degree of trust in e-commerce and have more experience in using the Internet. By the same notion this research explores the relation between trust in e-commerce and the acceptance of eHealth.

Although several studies addressed privacy and trust in the e-commerce field none have included privacy and trust together with technology acceptance factors, which might all, have an effect on BI. In addition, little empirical research has been done to examine the relationship among the three constructs: privacy concerns, trust, and behavioural intentions (Liu et al., 2005). Which is one of the objectives of this research.

Corritore et al. (2003) named EE as an important factor for the perception of trustworthiness. This is supported by findings reported by Egger (2001) and Sapient (1999). Therefore, it is wise to embed trust as a construct in technology acceptance models that focus on underlying attributes that contribute to perceived trustworthiness.

In non-commercial related contexts, trust is also expected to increase the performance expectancy (perceived usefulness) of an information system or the intention to use an information system (Wu et al., 2011). In this research, the hypothesis generated from trust revolves around: Does trust have an effect the acceptance of eHealth? Is trust related to attitudes towards online privacy? Does trust have an effect on PE?

Measurements of trust were adopted from (Liao et al., 2011) and with elaboration from (Sillence et al., 2007; Gefen and Straub, 2003; Bansal et al., 2010; Liu et al., 2005).

Therefore **hypothesis 7** was established, broken down to:

H7a: There is a positive relationship between the level or degree of trust an individual with online transactions and the individual's behavioural intentions.

H7b: Higher levels of trust may affect performance expectancy positively.

Questions used to measure online trust are:

Table 5.8 Online Trust Measurement Items

Questions Used to Measure Online Trust
Frequency of buying products online.
Frequency of buying services online.
I am extremely confident that my personal information is kept confidential when buying products/services online.
I am extremely confident that my personal Information is kept confidential when browsing for Information.
I am extremely confident that trusted health sites providing medical advice handle information in a proper manner.
I would trust buying products online from a company I don't know.
I provide my health Information to online trusted health web sites providing Healthcare services.
Frequency of using Health-related activities (e.g. online health advice, online prescriptions or online appointment booking).

5.3.3 Internet Experience and Exposure (ID)

Due to prior research it was seen that patient factors concerning prior experience or exposure to computer/health related technologies appears to be associated with increased technology acceptance. These include use of the Internet for different purposes and previous awareness and use of health web sites or health technology (Hardiker and Granta, 2011; Or and Karsh, 2009, Beekens, 2011; Johnson, 2008). Questions used for exposure to computer/health technology were partially adopted from (Hardiker and Granta, 2011; Or and Karsh, 2009; Johnson, 2008; Holden and Karsh, 2010; Wilson and Lankton 2012). Also some questions used to measure ID were newly developed but in light with (Hardiker and Granta, 2011; Or and Karsh, 2009; Johnson, 2008; Holden and Karsh, 2010).

About thirty million people in Egypt are Internet users. They are dependent on the Internet for information, communication, job tasks, e-government, e-banking and other ecommerce transactions. Questions were asked regarding the usage frequency of the Internet for different purposes such as communication, research, travel, education, finance and health activates. It is expected that high levels of Internet experience will increase users' tendencies to accept eHealth leading to the following **hypothesis 8**:

H8a: Internet experience and exposure (ID) might have an effect on eHealth acceptance (BI).

This assumption has also been supported by (Corbitt, et al., 2003; Wilson and Lankton, 2012) who emphasized that increased web experience lead to increase in shopping online and tendencies to accept eHealth. However, further emphasis by Corbitt et al., (2003) was made where increase in web experience lead to more privacy concerns online and an increase in user's web experience is positively related to trust. Therefore the following hypotheses were established:

H8b: Internet experience and exposure might have a positive effect on online privacy.

H8c: Internet experience and exposure (ID) might have a positive effect on online trust.

Increase in web experience might also affect effort expectancy positively, where users who have more experience on the Internet might therefore find using eHealth easy to use and free effort (increase EE). Therefore, Further interaction effects were explored between ID and EE based on the following hypothesis:

H8d: Internet experience and exposure (ID) might have a positive effect on EE

Questions used to measure Internet experience and exposures are:

Table 5.9 - ID Measurement Items

Questions Used to Measure Internet Experience and Exposure
Internet Frequency use for work related research
Internet Frequency use for personal finance
Internet Frequency use for Travel-related search (travel tickets, hotel reservations, trip reservations).
Internet Frequency use for Product information gathering.
Internet Frequency use for Communicating with others (e.g. chat/email/video chat/facebook etc.).
Internet Frequency use for Browsing for health information.
Internet Frequency use for education
I Internet Frequency use for current events

In conclusion, figure 5.1 below shows the proposed research model based on the UTAUT and extended with the additional constructs expected to be affecting users' acceptance of eHealth. These added constructs as mentioned above are: online privacy, online trust, satisfaction with medical care and Internet experience and exposure. The model shows the relationships among constructs based on the above established hypotheses.

5.4 The Proposed Research Model – UTAUT extension with the added factors.

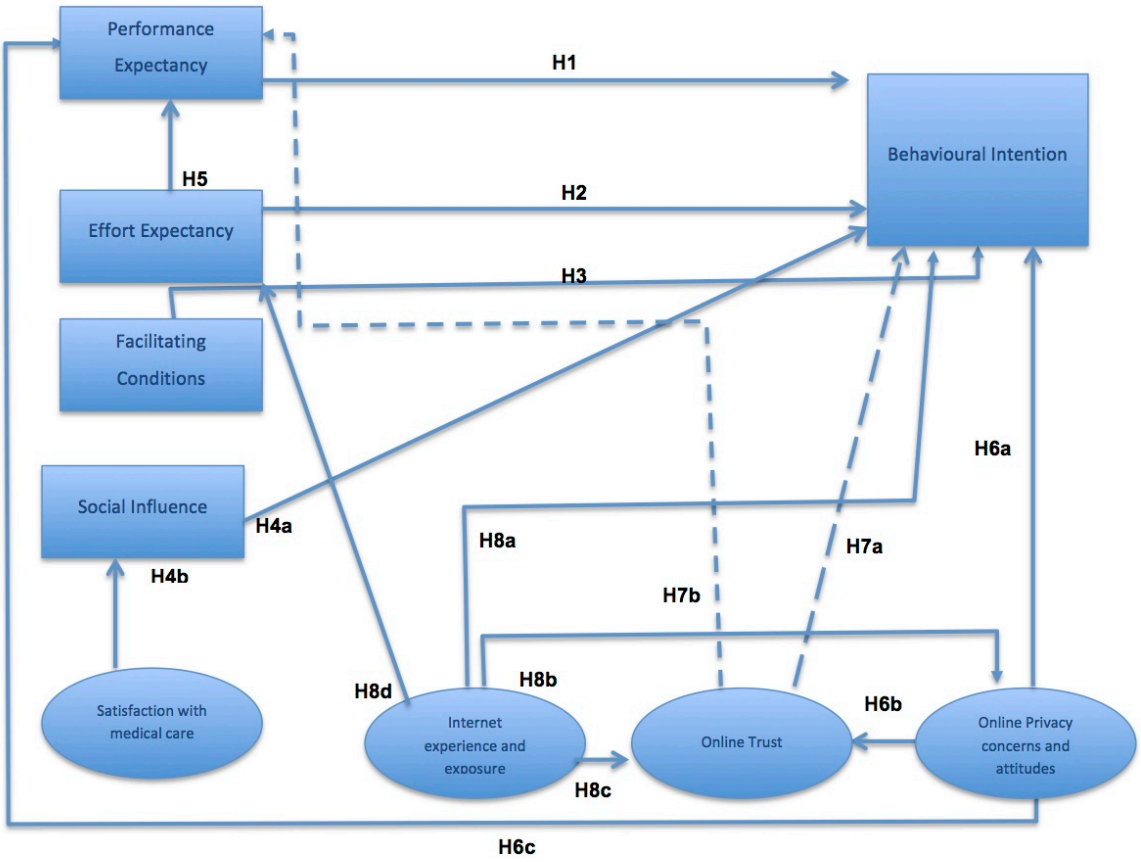


Figure 5.1 Proposed research model - rectangles depict the original UTAUT constructs, Ovals depict the added constructs. Example of relationships: H1 = Hypothesis 1.

The above figure shows the proposed model of this research. Rectangles in the model demonstrate the original UTAUT constructs whereas the ovals demonstrate the constructs that were added to the original model. Arrows show the relationship among constructs and the hypothesis established for each relationship. Hypotheses testing are discussed in the next chapter and significant influences found among constructs are demonstrated.

5.4.1 Demographics

Characteristics of users, defined by (Hardiker and Granta, 2011) include demographics data like age, socioeconomic status (educational attainment, social/marital status and income level), employment status and health status.

Similar to gender are age, marital status, economic status, health status, educational attainment, employment status, and employment sector which were used as descriptive statistics in this thesis also some direct correlations were done between demographic items and questions demonstrating eHealth awareness and privacy of health information (details are shown in the next chapter).

5.6 Summary

Successful technology implementation requires an understanding of how different system factors such as individual, human technology interaction, organization, social, task and environmental factors affect the acceptance of the technology (Or and Karsh, 2009).

The current research represents the first step in understanding acceptance of eHealth technology and it's influential factors in Egypt. For this reason, it was chosen to examine and develop on a well-known acceptance model like the UTAUT.

There exists a wide range of health care offerings and different users needs, for this reason, there is likely to be greater demand for applicable theories, models, and guidelines for testing eHealth acceptance. Although modeling eHealth acceptance is useful to health care providers, it is important to extend research to understand why users (patient side) should start and continue to use these systems, which has been argued by this research.

This chapter summarizes the development of the proposed research model based on the UTAUT with added factors previously discussed. It has also described the hypotheses established for this thesis and their testing will be described in the next chapter. Furthermore, explanation of the underlying constructs used within the empirical study has been addressed.

Technology acceptance factors discussed need to be given enough consideration where in case they are neglected this may lead to economic loss of massive expenditures on such projects and denial of use of eHealth. Therefore, this research is expected to help potential eHealth service providers to account for such. Most of the measures used in the literature were generic not health specific. A reason stated by

(Holden and Karsh, 2010) for this is that scholars probably did not recognize the benefits of contextualizing technology acceptance constructs for health care and the costs of not doing so. Another reason is that they could be biased to what could be meant by PE, EE and SI for example to eHealth users. In order to overcome such dilemma the pilot study conducted served to answer all these misunderstandings by simply finding out the degree that people understand the items and opinions of researchers in the field on how to make these items more appealing and meaningful for the eHealth context studied. This was found to be in line with the belief elicitation method introduced by (Holden and Karsh, 2010) for resolving misunderstandings and lack of contextualization of constructs in the health domain.

Many researchers have emphasized that eHealth acceptance research needs testing the predicted relationships (1) in different application domains, (2) with different methods, and (3) including more variables (Davis, 1989; Chau & Hu, 2002; Harrison et al., 1997; Mathieson, 1991; Wilson and Lankton, 2004; Egea, and González, 2011; Hardiker and Granta, 2011; Riegelsberger, et al., 2005; Beekens, 2011; Paine et al., 2007; Patil et. al., 2006; Olson and Maio, 2003). Hence, this research has therefore tested several factors that affect the acceptance of eHealth by adding online trust, attitudes to online privacy, social influence, satisfaction with medical care and Internet experience and exposure. This therefore fulfills part of their future works in applying such models in another domain other than ecommerce but specifically in the eHealth domain as well as filling the gap in the eHealth acceptance domain regarding the embedding of these factors.

The next chapter discusses the analysis steps undertaken for both quantitative and qualitative data and presents the results arrived at. The chapter also presents the results in accordance with hypotheses testing.

Chapter 6 - Data Analysis and Results

In this chapter, both quantitative and qualitative data analysis and results are presented. First, the data collection procedure will be described. Second, analysis and results of qualitative and quantitative data will be presented followed by testing the established hypotheses. Third, the chapter concludes with a summary.

6.1 Introduction

Silverman (2010, pp194) describes survey research as using a predefined fixed set of questions, which are often derived from pre-tested measures used in other studies, usually known as the research protocol. This is used when there exists a large sample and there is a willingness to statistically test significance and therefore fixing the questions can help to increase the reliability of findings. On the other hand, qualitative interviews tend to be conducted with a small number of people and with rather informal patterns of questioning where the aim is to allow the interviewee to set the pace. However the interviewer usually has a prepared set of questions used as a guide (ibid) (Please see the Interviews questions guide of this thesis in Appendix B).

This research, as discussed before in Chapter 3 (Methods) addresses the technology acceptance factors particularly those affecting the acceptance of eHealth technology. The main issues underlying these factors are those associated with the sharing of personal and health Information in respect to online privacy, trust and Internet experience and in turn their impact on the acceptance of eHealth technology. Furthermore, the construction of the survey drew from underlying technology acceptance concepts investigated from the literature that was discussed in chapters two, four and five. Interviews conducted serve as ‘putting the flesh on the bones’; by means of further explanation, exploration and understanding the managerial side of eHealth acceptance form the Ministry of Health and Populations (MOHP) and management in hospitals. In the next section, interviews and their results are first addressed to involve the reader in the logical and actual sequence that was experienced in this study.

6.2 Data Collection Procedure and Interview Results

Interviews were conducted to understand the relationship of the underlying constructs of the proposed research model with eHealth acceptance from the point of view of management/practitioners as parties working under the Ministry of Health and Population (MOHP). The interviewed parties included: Egyptian MOHP senior officials, hospital managers and some doctors. This also served for the process defined as "collecting converging evidence from different sources", (Yin, 2011 pp. 79).

Qualitative data analysis was done in steps: First, data obtained from interviews was documented and examined, and several attempts took place to extract the information relevant to the study and put into categories. This information was supported by quotations from interviews, or specific evidence in line with (Creswell, 2002). The next step involved attempts to find connections between these different categories. Content analysis was the main method used for analyzing quantitative data, which is characterized by its theory driven approach through setting a number of rules to be followed during data analysis which led to confirming or denying the effect of some of the research model underlying constructs.

Validation of qualitative data was based on Creswell (2002), which is mainly to investigate the extent to which they provided similar facts. This approach was adopted following scholars who used a mixed methods approach too such as (Azab, 2009; Abdelghaffar, 2008; Kowitlawakul 2008).

6.2.1 - Results from Interviews

To gather part of the necessary data for this empirical study, the Egyptian Ministry of Health and Population (MOHP) was contacted. The Head of IT/IS department at the MOHP (Dr. Salah Badr, also an IT professor at the Cairo University) was interviewed twice. Both Interviews took place at his office in the MOHP building situated in Qasr el Einy, Cairo.

6.2.1.1 - First Interview

The first Interview lasted for approximately two hours. The interview's objectives were mainly three. The first was to understand the state of research done in Egypt regarding eHealth, state of automation in hospitals and technological issues regarding health records and IT use. The second objective was to elicit an expert opinion regarding the questionnaire design since the official is also an IT professor; hence this interview was

also part of the pilot study. The third objective was to validate the sample characteristics and get recommendations or help to gather more random participants. The goal and specific details of the empirical study were carefully explained then the first interview was conducted which elicited the following:

Concerning the novelty of the research, the researcher wanted to make sure that there hasn't been any survey research done to test the acceptance of eHealth in Egypt as well as to know the state of art in Egypt regarding eHealth research. This was necessary for the researcher to know if there was any work out there that can be built on in addition to the extensive literature review that has been conducted. The MOHP official confirmed that this study is the first attempt towards eHealth research in Egypt. The following statement supported this:

"There are no surveys done in Egypt regarding testing privacy perceptions/attitudes against the degree of acceptance towards eHealth, not even in general eHealth in Egypt yet…".

He was very keen to discuss the issue as he has emphasized that an eHealth initiative might be on its way soon especially after the successful use of e-government services now in Egypt for some years. His emphasis was on that this research is of interest to the MOHP plan for eHealth initiative, particularly the results. Furthermore, his approval was obtained to go on with the research in collaboration with the MOHP. Encouragements regarding the research was experienced and supported by the following statement:

"The research is a very good idea and we can formally work together through the Ministry of Health, I would also like a copy of the results after finishing the analysis because this will serve as a starting point towards the eHealth research direction and initiative from the patients side in Egypt…".

Regarding the automation state of public hospitals and clinics in Egypt, the government official was asked about the state of automation in public hospitals and clinics generally as this was necessary to understand in-depth managerial views. It was noted that to that date (2011) four hospitals and eight clinics have been automated and there is a plan to automate the rest of public clinic and hospitals, which are around 20 clinics. This was supported by:

"Automation of health records in public hospitals here in Egypt has been planned and actually started, so far four public hospitals have been automated, there are also insights for automating two other hospitals specifically Wadi el Nile hospital and the Intelligence Institute hospital. Also plans for automation of 20 clinics and till date have accomplished the automation of eight clinics".

The researcher was also keen to know the type of data that MOHP keeps record of. The main types of data that were saved were death and birth dates accompanied by the reasons of death, mainly for general health description statistics of the population. This was supported by:

"The data collected is not in the form of medical records, the data that is collected and computerized is that concerning birth and death in terms of dates and knowing the reasons for death. However, some private clinics might collect data from their patients like medical histories but in manually handled hard copy files under the responsibility of each doctor…"

Regarding the aim for an expert opinion on the questionnaire survey (part of the pilot stage), the government official was also asked to give feedback on the questionnaire design aspects and questions used. A few comments were received from his side on length, minimizing the data entry, rephrasing of questions with reason that people will not understand eHealth just by term but elaboration and breaking down of items are necessary which was taken into consideration in the amendments. This was supported by the following statement:

"What I like about the questionnaire is that it addresses privacy issues in a logical sequence that may prevent bias, however it is a bit long and using Likert scales is best to avoid boredom upon those who will fill it in…".

Regarding the "Internet literate" criterion for respondents in the sample, he confirmed that it is necessary that this research should be addressed to Internet users to get clear meanings on the issues studied. This was supported by:

"People filling this questionnaire need to be ones using the Internet or at least have some experience using the Internet or else it would be just useless because people will not understand the concepts you are examining as they have never been exposed to the Internet…"

The government official was asked about what the MOHP could offer to help in conducting the research or what are the possible recommendations for a larger data gatherings scale, which is in addition to the random distribution plan already in place, in order to get more responses (larger sample size). A lot of support was provided from his side by recommending the researcher to visit another MOHP contact after a telephone conversation with the official.

The government official was also asked about whether on the other hand if physicians are trained to use IT in their work routine? This was to understand and base

recommendations to eHealth providers by moving towards an initial step for those interested. It was confirmed that physicians are already using computers due to their jobs and research nature as doctors. In addition, form the governmental side; particularly the MOHP provides relevant training to physicians. This is due to the MOHP being keen towards developing the physicians' computer skills to more advanced levels. This was supported by the following statement:

"We provide courses managed at the ministry of health for doctors and hospital managers of different rural areas…". He also emphasized that if a practitioner perspective needed as part of the research then the survey could be handed over to them as they satisfy technology literate criteria.

Due to his limited time and responsibilities a second meeting was arranged to discuss other issues after the final questionnaire was designed. The Interview outcome has shown overall interest in the research topic from the official's side and emphasis was done on that the results are important to the Egyptian Ministry of Health and Population.

6.2.1.2 - Second Interview

Referring back to the importance of the pilot study in this thesis where modifications, were based on interviews with experts/researchers in the eHealth domain and IT in general as with the previous interview with the MOHP senior official (Please see Chapter three for more detail). These included eliminating irrelevant items or rewording existing items for better acceptability and understanding to the target sample. After completion of the pilot study and finalizing the questionnaire items the second interview with the head of the IT/IS department at the MOHP was conducted after a few weeks and lasted for two hours and 20 minutes. The objectives of the interview were: first to elicit opinions on underlying questionnaire constructs, second to get an update on the automation status of hospitals to date, third to know if there are available funds directed for the MOHP ICT plan and also to understand privacy issues from their side. The interview elicited the following:

Concerning any updates towards the eHealth situation the researcher asked the government official if there are any updates towards the eHealth situation in Egypt to date of the second interview (2012), he confirmed that there hasn't been any changes for the past weeks especially due the political and economic status that Egypt was facing at that time. Particularly there was fear among majority of people of not wanting to take responsibilities or actions that they might be accused of. However according to the automation plan that he mentioned earlier in his first interview, another four public hospitals were automated. There is a plan to have a centralized database at the MOHP

that aims at linking and centralizing all the automated records from these hospitals. The interesting part was that a telemedicine project was established in joint with Germany. The project's aim was to provide communication and linkage between patients in Upper Egypt and doctors in Cairo or other big cities. The following statements supported this:

"Not much updates or progress has been done in this period since the revolution due the country's situation. Everything is on halt now, no one wants to take the responsibility in initiating any projects".

However he did mention,

"Four major public hospitals has been fully automated now and planned to be centralized at the MOHP database…"

" There was a pilot telemedicine project between physicians in Cairo and big cities at one side and patients at medical centers in Upper Egypt on the other side in joint with Germany as the sponsor for this project. However, this project has come to a halt due to the situation of the country and some funding problems…"

The researcher was keen to understand how this project helped patients in terms of its usefulness and asked for further explanation to relate such an experience with the underlying constructs. It was confirmed that this project brought about many benefits where doctors were contacted by patients remotely having the ability to look at x-rays and medical results. Other benefits were the reachability of medical care to people located in Upper Egypt who require long distance travel to Cairo to access health care and experience poor health and medical care services offered there. This was supported by:

"This project allowed doctors to contact their patients in Upper Egypt specifically by receiving X-rays and different medical results for diagnosis. Also to provide communication between both sides to help these patients in these areas especially due to the lack of existence of big hospitals and certain specialties over there…"

"Some people are unable to travel due to limited income and resources and they had the opportunity to contact big health care practitioners and professionals using this project. These people are situated far away from Cairo and using such technology would facilitate their communication with professionals and getting medical feedback as well as it reduces their travelling expenses…. Instead of them going back and forth and through bureaucratic channels. Also, regarding resources needed to establish this, its not much after all, all you need is a connection in both clinics, no big deal...".

Regarding the eHealth initiative from the MOHP side, and further eliciting information regarding underlying constructs, the government official was further asked if any other projects started or will be resumed after the country's situation stabilizes, It was confirmed that there is child immunization scheme that is planned for, where citizens will receive notifications on their mobile phones with the date of child immunization campaigns. The MOHP also has planned to launch another mobile notification service that answer responses about availability of certain blood types in hospitals, vacancies in hospitals and guiding/redirecting citizens to hospitals with needed specialties upon requests. It was also emphasized that there is working landline telephone service that helps answer citizens' requests on similar issues. In order for the mobile notification service to take place, collaboration with telecommunication industry is planned. This was supported by:

"The children immunization scheme is planned to be further developed where an SMS could be sent to citizens with dates of immunization campaigns and increase awareness of its importance among people. This needs collaboration with private mobile telecom services to get the phone numbers needed. Also the mobile numbers that we can get would be useful to citizens where they can send an SMS and the response directs them to the appropriate hospital(s) straight away in replying to emergency cases. Like for example in replies to the availability of hospitals with storage for a certain blood type…."

"There is a working telephone service now for citizens that provides help in accidents and emergencies for example to direct people to hospitals which have a certain blood type storage that they need or a certain medical specialization…".

Furthermore, the official was asked about whether there is a timeline for the complete automation of public hospitals and what sort of data is the MOHP keen to collect as well as the available funds available for eHealth generally. It was understood that there are 550 public hospitals and centers in Egypt and that the relevant budget available for each hospitals is around 2.5 to 5 million pounds. Automating this number would require years to accomplish however it has already started. This was supported by:

"There are 550 public hospitals and for such a mass to be automated it would need about ten years because the budget allocated for each hospital ranges from 2.5 to 5 million Egyptian pounds. The government has access to aggregated summarized data for example how many people have HIV, aids and the such diseases for statistical purposes and health indicators in accordance with the WHO".

Regarding information privacy issues and patient confidentiality, finally, the official was also asked about who will have access to the medical records when automation is

complete? It was emphasized that the priority goes for the patient and should have the control over his medical data and in turn approve access to his doctor. Regarding the eHealth initiative, some insights were addressed on magnetizing the SSN with the patient medical history in summarized form for example, Blood type, Diabetic status, blood pressure status, Allergies etc. This was supported by:

"According to privacy rules and confidentiality of data, the patient is the one to have the right to allow access for this type of data maybe having a pin number embedded in his SSN that he can disclose when visiting a hospital or a certain doctor. Of course you know that doctors upon graduation swear to practice medicine ethically and honestly known as the Hippocratic oath".

The Interview also concluded very good outcomes, which are:

- The government official directed the researcher to and arranged for an interview instantly with the vice president of the specialized medical centers and hospitals under the MOHP (Dr. Doaa Fawzy). This organization is the supervisory body over all public health centers and hospitals under the MOHP in Egypt.
- Insights and explanation regarding automation plan of hospitals was obtained.
- Understanding of privacy issues from the managerial side as well as the level of skills available for physicians and staff was understood.

6.2.3 Interviews with the vice president of the specialized medical centers and hospitals (MOHP).

Two interviews were conducted with Dr. Doaa Fawzy. She graduated from the American University in Cairo and has worked in the academic field before receiving her post at the government. The fist interview was instantly after the previous interview, which was face to face, and the second was a telephone interview.

6.2.3.1 First Interview

The first interview was conducted with the senior official at her office in the organization's building in Nasr City, Cairo (2011). The interview's duration was one and a half hours. Objectives of the Interview were: first to get another opinion on the questionnaire design. Second to receive recommendations for the appropriate target sample, as to validate criteria for respondents in the sample. Third, to get help on the distribution of the questionnaire for more responses.

Regarding the questionnaire design and wording she was asked her opinion on such. A confirmation was gained on the questionnaire design being understandable and addressing the underlying concepts. The following statement supported this:

"The questionnaire looks fine, it is understandable from my point of view and it does cover eHealth, privacy aspects and trust issues that you are aiming to investigate…".

Regarding the target sample selection criteria for the questionnaire and after conducting some phone calls with the staff and the head of IT/IS at the MOHP whom was previously interviewed, she has confirmed that such services in Egypt "eHealth" are to be directed to those who are computer literate. The following statement supported this:

"Of course such services are ought to be for Internet users, at minimum to be for those who have even some experience to use the Internet, a computer illiterate person will not understand some of these issues in terms of operability and usefulness, already many people in Egypt are using the Internet for many purposes…"

Regarding the distribution of the questionnaire aiming for a larger amount of responses, she was asked if she could help on such issue. She was very helpful and she proposed hospitals that are suitable places to find people whether patients or working staff (who are health care users too, excluding doctors). The most important was to randomly distribute the questionnaire as to follow the same scheme. She proposed five hospitals as well as provided the names of the contact persons who were the hospital managers in each of the recommended hospitals.

The vice president then provided all addresses of the Egyptian public hospitals that she recommended and emphasized and that due to eHealth being a new concept it would be wiser to conduct a random sampling technique to avoid biases. All hospitals were approached through the contact person provided by her.

Regarding eHealth the senior government official was asked whether Egypt would undertake such initiative in the near future. It was emphasized that an attempt has been made already where a medical website for physicians is on its way for launch. This website provides medical information for doctors that helps them in research and medical diagnosis. The following statement supported this:

"Well yes, we do have plans for such, as a first attempt we already are planning for the launch of a website very soon, for the use by practitioners that would include medical and scientific information to help doctors in diagnosis".

This point was particularly important for the researcher as it helped to gain an in-depth insight of managerial views regarding eHealth acceptance. Another telephone Interview was further conducted mainly for this purpose. One of the interview outcomes was shown interest from her side in the research topic and a demand for the results was emphasized, as this is very important for eHealth research on acceptance to the MOHP. Contact details for the recommended hospitals were given to the researcher as well as offering non-stop help for the researcher in the future on any possible issue. The senior official was contacted several times by phone for appointment arrangements between the researcher and contact persons in hospitals (hospital managers).

6.2.3.2 Second Interview

The second interview was conducted by phone with the senior government official and lasted for 35 minutes. The interview objectives were first to address the underlying constructs of the research model, second to further understand the automation attempts made by the MOHP at that date. Third, in-depth understanding of managerial views was also an important objective.

Regarding the usefulness of eHealth services (performance expectancy) the senior official was asked about her opinion on performance expectancy (whether eHealth service are useful). She also emphasized that this is very useful which would save time and money as well. The following statements supported this:

"Yes it is very useful for both sides whether the patient or the doctor. For the patient it is useful where he could have online access to know his/her pension plans and medical insurance access it would help the patients to know his rights for medical care…"

"Online communication would help the patient send an X-ray or lab results for example and wait for his doctor's opinion. This is helpful instead of booking appointments and waiting in queues, which would save him so much time as well as travelling expenses….".

She further added *"Health online could also help patients to seek information regarding their health conditions where they can be more aware of symptoms and get answers for issues they are curious about. Also not to forget that when anything is online then a person can book appointments online instead of hideous phone calls also maybe get prescription refills and even he could buy medicine online…".*

Regarding the performance expectancy from the doctors' side and if they are using the medical web site (*"Up to date"),* it was emphasized that it has been launched and used

by many doctors in all hospitals and clinic. Up to date is an online system that provides scientific medical information for health practitioners' use. This system helps doctors in medical diagnosis, looking up of scientific terms, systems and for their personal medical research. The following statements supported this:

"First of all this is very useful for the doctor.. for his expertise which would keep him updated with scientific details in the medical field. The website is now available to all hospitals and centers in Egypt for the doctors which they are using now…"

"The website is called "Up to date". From its name it shows that it includes up to date scientific medical information for doctors to use. This can be used in their clinics, in ER rooms right on spot. For example in cases where a doctor maybe confused about a diagnosis, information on the website helps him to clarify this confusion. The doctor enters the relevant information on the website and through a DSS it responds back with a medical diagnosis. This is especially helpful in complex diagnosis which is very important and need to be done properly with as much information to be available a possible…"

She also added:

"The website also provides all sorts of medical information, scientific terms particularly for doctors research and helping them in carrying out their jobs to diagnose and take actions".

Regarding the ease of use or effort expectancy to doctors, she confirmed that it is easy especially that doctors already use computers and the Internet due to their jobs and since being at medical schools. Emphasis was based that Internet services are available everywhere now on mobile phones or through USBs connected to laptops directly. This was supported by the following statement:

"Yes all doctors are computer literate because this is part of their job, they go to conferences and some are allowed access to taking courses abroad, which accordingly due to the nature of their jobs it is yes easy to use…"

It was also important for researcher to understand privacy and trust issues regarding the communication online between patients and doctors. The senior official said that there are no privacy laws to govern such transactions but it is important to be established. However this depends on the patient's willingness to communicate with the doctor online. Regarding online trust, similarly it was concluded that trust is an important factor and using the Internet implies that doctors trust using online transactions. This was

supported by the following statements:

"Yes trust is an important factor for eHealth to happen and it all depends on the patient and his privacy perceptions…".

6.2.4 Hospital Managers Interviews

6.2.4.1 Interview with Cairo El- Fatemeya Hospital Manager

The interview with Dr. Tarek Elsayed (Masters in hospital management), manager of Cairo Fatemya hospital, was conducted in his office and lasted for approximately one-hour and 15 minutes. The Interview objectives were to find common relationships and views regarding the underlying concepts of the study. Particularly addressing eHealth technology acceptance factors for example: performance and effort expectancy of using eHealth, willingness of doctors, their computer skills and awareness of such systems as well as the availability of IT resources.

It was noted that an important factor for technology acceptance to take place is that doctors themselves should be convinced with using the technology, in other words, doctors need to realize the benefits of using such systems. A draw back noted by the interviewee is that doctors are happy to have crowds of patients in their clinics that are coming with tests and x-rays urging their opinions as this raises their self-esteem. However on the other hand if they realize the benefits then they would be the first to ask patients to communicate with them electronically where relevant. The following statement supported this:

"Doctors like the idea of having crowded clinics with patients coming in with papers, tests and X-rays. If doctors approve and understand the benefits for using eHealth then they themselves will ask patients to send them X-rays and test results through emails. As of course from the practicality and usefulness point of view of eHealth technology, it is very important especially in prescription refills, appointment booking, having access to patient data in electronic form and it will save so much time for both sides if patients and doctors communicate together electronically."

The researcher wanted to further understand if doctors have the skills to use such technology and it was found out that doctors due to their "highly classified education degree", use computers and the Internet for various purposes such as in accessing medical systems for scientific information and for their own personal research. It was also noted that doctors now have agreements with institutes in Egypt to conduct their post graduate degrees in hospitals management courses and involving IT aspects in the study. Due to his limited time it wasn't possible to elicit more information.

6.2.4.2 Interview with Bank El-Ahly Hospital Manager

Another Interview was conducted with Dr. Alaa Awad, manager of Bank el Ahly hospital (Master degree in hospital management). The interview lasted for one hour and 45 minutes and its aims were around the performance and effort expectancy of using eHealth, willingness of doctors, their skills and awareness of such systems as well as the availability of IT resources.

Regarding performance expectancy, it was concluded that using eHealth technology services is very useful in terms of the communication between users (patients) and doctors. Online communication as emphasized by the interviewed party could allow for booking appointments online, viewing medical lab test results and sending x-rays. eHealth was also noted to be useful due to its time saving, and for the benefits of accessing online health information that would help in diagnosis. Regarding effort expectancy it was concluded that using the Internet generally is very easy now since people now access it on their mobiles and computers/laptops whether at home or work. Having systems that can provide online booking and other services will lead to less crowds in hospitals and centers from patients just coming from for these issues. In addition telephone lines will not be as busy which will help to reduce patient frustration when booking an appointment. The following statements supported this:

"Using eHealth technology brings a lot of benefits for example booking appointments online, sending an x-ray or lab results to doctors will be very time saving and expense saving…"

"Telephone lines will not always be busy when patients call for appointments for example…"

"I think it is easy to use such services as long as you have an Internet connection, which most of the people do nowadays using their mobiles and their computers, then accessing these services is easy…"

Regarding the issue of whether doctors have the relevant resources and skills to use eHealth technology, it was emphasized that doctors are all highly educated and are heavy Internet and computer users because already some doctors do exchange X-rays and medical results online for joint consultations on particular medical issues. This was supported by the following statements:

"Well yes doctors as you know are regarded in this country as having the highest

degree of education. They use computers all the way in their research and use the electronic equipment as "hands on" when doing their job. According to resources availability doctors have computers in certain clinics and some have their own laptops for research purposes and of course with Internet connection…"

"Here at the hospital, we provide IT courses, interpersonal skills, and communication skills courses for the doctors and staff. These course are particularly to rise with the value of communication between both patients and doctors which is the core of our jobs, also for communication between the staff generally…"

"Being a doctor is a very noble job and there is a need to further educate our staff on how to deal with patients, mainly talking about the human side here, patients come to a doctor with the hope of getting good care and good communication exchange…."

Regarding the privacy issues associated with eHealth technology, the researcher wanted to further understand their impact on the acceptance of eHealth technology. It was concluded that privacy issues are important to be addressed and this lies solely in the relationship between the patients an the doctors where patient expect that privacy issues are dealt with in a proper manner but when it come to online, doctors would deal with information privately and confidentially as they do when offline. This was supported by:

"Privacy in online commutation will never end, it will always be there nagging any sort on online communication. Doctors anyway deal with their patient information privately this is according to the Hippocratic oath which they swear when attending the medical school. There is no reason for doctors to deal with patients medical information in another manner….".

6.2.5 Interviews with Doctors from Different Specializations

During the researcher's visit to the hospitals, there was a chance to interview five doctors. The doctors practiced different medical specializations. One was a bones doctor, one a brain surgeon, one doctor worked at the ER department and two were general practitioners. These five interviews mainly discussed the performance expectancy, effort expectancy, privacy and trust issues, and skills and resources availability. Each interview at most lasted half an hour because doctors were very busy in checking on their patients and tight with clinic working hours.

As a conclusion to these little interviews, doctors showed great interest regarding the overall concept eHealth technology and expressed that it is useful in the communication

between themselves as doctors when wanting to get each other's opinions during medical practice. Further on, this would facilitate the communication between them and their patients when it is not necessary for patients to come to the clinic in person. Digital format of heath information to them is very useful since they already have some pictures of organs during surgeries for example on their mobile phone and laptops. Digital format of X-rays and lab results and general medical data is also sometimes exchanged among them by email. Overall it is a practice that they tend to prefer with the availability of the Internet and advanced mobile devices. Besides the perceived usefulness of eHealth, interviewees also expressed that using the technology is easy. Furthermore, privacy online and online trusts are important factors and there is a need to have laws and regulations to govern the confidentiality of patient information. However, it was emphasized that this depends on the patient willingness to use eHealth. These conclusions were supported by:

"Yes, using digital transfer or online communication as you specify is very useful, I can look at a brain tumor photo for example and further do medical comparisons…I already have some on my laptop and mobile..."

"Communicating with patients online is very useful and easy. If you have an Internet connection and know how to use the Internet then it is fine. My patients can send me x-rays and test results through emails, I can even further give some advice and primary precautions to them until I next see them, by the way some of patients already do so…"

"We as bones doctors send X-rays online to take each other opinions all the time…if the case is not necessary to come in person, then why not just send the tests online and if I need to see the patient in person, I will ask for this…"

"Privacy is different when online, but if there is a will for the communication in the beginning then it is expected that doctors should deal with patient information confidentially…It all at the end depends on the patients desire to communicate online…"

6.2.6 Summary of Qualitative Results

Electronic health records and eHealth technology have great potential to improve the quality and safety in health care, however these improvements will only occur if physicians have access to key functions in these systems (Or and Karsh, 2010), and on the other hand, if they also approve using these systems and foresee its potential benefits. This research has focused on the user's side (patients) but however the researcher wanted to further gain some insight on the degree of applicability and acceptance of eHealth by the other side (practitioners and governmental/managerial

side). This was done by the previously addressed interviews conducted with governmental officials at the MOHP, hospital managers and some doctors.

The results have shown that the interviewed parties agree that there is a degree of usefulness (performance expectancy) to be gained from eHealth technologies. Regarding effort expectancy and performance expectancy of the parties, it was deduced their acceptance (BI) increase due to their effort expectancy and performance expectancy. Furthermore, privacy attitudes and concerns have shown some impact towards acceptance however with greater negative effect from the User's side and this is explained perhaps because it is their data that is to be exchanged online. From the MOHP practitioners side (interviewed parties) privacy issues are not of great concern as the majority of the interviewed parties specified because privacy should be guaranteed and that medical data must be kept private and this is mainly due to the nature of their job where medical data is a must to be confidential. Therefore they haven't showed much concern or fear that patients' data might be misused in an inappropriate manner.

Therefore, the main emphasis made by the people working under the MOHP (all interviewed parties), is that privacy is important and there is a need to reassure patients that such transactions are handled privately. Also, there is a need for clear policies to be established when the eHealth initiative takes place. Practitioners have also specified that it is up to the user (patient) himself to decide or *trust* that there data is confidential just as their perceptions were when dealing with health offline. The Hippocratic oath that practitioners swear when at the medical school ensures this too as specified by most of the interviewed. Furthermore, all of the parties have shown interest to use eHealth technologies especially with the availability of resources from their side, which explains the facilitating conditions factor's importance in technology acceptance. It was deduced that relevant computer skills/resources and Internet skills/resources are available. This was from the interviewed parties emphasis on that they use the Internet on different devices and computers generally in research as well as when doing some consultations between each other.

Finally it was noted from interviews that most of the parties are at least masters degree holders in hospital management, which has been newly introduced at the University. Such specialization introduces various IT aspects related to health care and eHealth. It was noticed that the trend among all doctors is to start their masters upon graduation straight away in particular this relatively newly introduced program *"Masters in hospital management".*

6.2.7 Procedure

The questionnaire was randomly distributed online and in hardcopy form. The web

based questionnaire survey was written in both the Arabic and English languages created by “smart surveys” and “survey monkey” respectively (due to their language construction support as online survey creation tools). The questionnaire was made available online for a period of 6 months from November 2011. Users accessed the survey through the sent URLs directing them to the questionnaire in the two languages for their choice. Protection was placed using the features of the online survey developer tool where each respondent was allowed to access and answer the survey only once. However, respondents were also allowed to save their survey at any point and access it later on for completion according to their time management.

On the other hand, hardcopies were also distributed in organizations using snowballing techniques with the help of colleagues, friends and relatives in addition to those distributed in the recommended hospitals. The recommended hospitals were in Cairo (see Chapter 3 section 3.4.2). The recommended five public hospitals were willing to collaborate except one where each hospital was averagely visited about 2 times and each visit lasted for as long as 5 hours on average depending on the availability of the public relations staff needed to direct the researcher to the patients and other staff members in different specializations. Questionnaires distributed in the formerly mentioned public hospitals were in hard copies.

The completed surveys included both online and hardcopy distributed surveys. Total number of surveys that was used in data analysis is N= 402. It was difficult to keep track of online surveys therefore a response rate would not be very accurate. On the other hand, hard copies distributed in total were N=200 and collected N=126 yielding a response rate of about 63% which is considered as good (Van der Velde et al., 2004), the rest of the responses were online responses.

The questionnaire included a total of 32 items that asked respondents to rate their agreement/disagreement using a five point Likert scale from 1 (=strongly agree) to 5 (=strongly disagree) to understand their attitudes towards their provision of general personal information and health information when using eHealth services, degree of comfort towards aspects of eHealth use and answer questions regarding information privacy concerns as well as specifying the frequency of their Internet use and general internet and computer usage questions. Furthermore, the survey aimed to understand the following issues: 1) respondents’ skills and experiences of using computers and the Internet; 2) their access to and experience of eHealth technology; 3) their views of the potential usefulness of eHealth; and 4) their perceived requirements for and barriers to the implementation of eHealth, trust factors affecting online transactions and their attitudes to online privacy; 6) their perceptions on the usefulness and ease of use to communicate with doctors, appointment reservations, prescription refills, access to

medical lab test results, buying medicine online, communicating with doctors online. In addition to using five point Likert scales, other questions were in the form of a 'yes/no' response, multiple-choice questions, and a few open-ended questions for elaboration on issues for example: "Do you think your health information should be private? (YES/ NO)" then the respondents were asked to state, "Please say why you think so". The research used a combination of these questions to grasp as much Information as possible from respondents.

6.4 Data Analysis

Data analysis is commonly divided in two categories: exploratory and confirmatory. Exploratory data analysis explores the data trying to find out what they tell you. Confirmatory data analysis seeks to establish whether you have actually got what you expected to find (Robson C., 2002 pp. 40). Robson refers to (Van de Geer, 1993) in explaining data analysis as:

"The scientist does all kinds of things to his/her data…. and at the end of this thoroughly unrespectable phase, he or she comes up (miraculously) with a theory, model, or hypothesis. This hypothesis (es) is then tested with proper confirmatory statistical methods. This is a complete travesty of what actually goes on in all sciences some of the time and in some sciences all of the time. There are no two phases that can be completely distinguished"

Quantitative data analysis was done by the SPSS (Statistical Package for the Social Sciences) software program (version 20.0) and AMOS (version 20.0, Build 817) to analyze the data for descriptive statistics, frequency statistics and regression analysis. The significance level was set at *P*-value ≤ 0.05. Statistical analysis included the following steps: Descriptive statistics was done where categorical data were presented as frequencies and percentages, Factor analysis was performed and resulted in elimination of a number of dimensions which were extracted under each construct and assessment of reliability and validity was undertaken to assess the reliability of the model, Cronbach's alpha reliability coefficient was used since it is the most common method of estimating the reliability of an instrument (details are described in forthcoming sections).

Qualitative analysis was done by first documentation of the data obtained from interviews with the government officials at MOHP in Egypt and from interviews with hospital managers and doctors. The researcher focused on information that is relevant to the study. Finally the categories that emerged with analysis were examined to

compare their relevance with the research hypotheses. For example, examining the interview questions related to the perceived usefulness/performance expectancy of eHealth services was related to hypothesis one and two showing their impact on acceptance.

6.4.1 Reliability

There are two basic goals in questionnaire design: to obtain information relevant to the purposes of the survey and to collect this information with maximum reliability and validity (Warwick & Linninger, 1975). The reliability of a research instrument concerns the extent to which the instrument yields the same results in repeated trials (ibid). Reliability has two dimensions referred to as repeatability and internal consistency (Zigmund, 1995). Internal consistency refers to the ability of a scale item to correlate with other items in the scale that are intended to measure the same construct. Items measuring the same construct are expected to be positively correlated with each other.

Cronbach's (alpha) is commonly used as a measure of the internal consistency of reliability. The coefficient normally ranges between 0 and 1. The closer it is to 1.0 the greater the internal consistency of the items in the scale. Nunnaly (1978) has indicated 0.7 to be an acceptable reliability coefficient but lower coefficients are sometimes used in the literature (0.6). All constructs in this study yielded an alpha coefficient > 0.7. Specifically, results obtained show that all alpha coefficients were acceptable (Over 0.7), indicating a high level of internal consistency or homogeneity among the items under each construct (Straub, 1989). The Cronbach alpha for each construct is presented in Table 6.1 below.

Table 6.1 – Model variables alpha coefficients.

Model variables	Cronbach alpha coefficient
Performance Expectancy	0.862
Effort Expectancy	0.726
Social Influence	0.762
Facilitating Conditions	0.758
Privacy attitudes and concerns	0.752
Trust	0.737

Satisfaction with medical care	0.775
Exposure to computer/Internet technology (Internet dependence)	0.738
Behavioural Intention	0.804
Overall items reliability	0.862

6.4.2 Measurements

Items for the UTAUT model were adopted from the original founders (Venkatesh et al., 2003) and from (Holden and Karsh, 2010; Wilson and Lankton, 2004), while items for online trust were adapted from (Liao et al., 2011). Privacy attitudes and concerns, intention to transact and intention to retrieve privileged information were adopted from (Jensen at al., 2005; Ackerman et al., 1999) for details (please also see Chapter 5).

6.4.3 Validity

Validity can be defined as the degree to which a test measures what it is supposed to measure. There are basic approaches to the validity of measures including content validity and construct validity (Manson & Bramble, 1989). This study uses factorial validity as a form of construct validity done through factor analysis. Factor analysis is a statistical approach involving finding a way of condensing the information containing a number of original variables into smaller sets of factors, also called dimensions, with a minimum loss of information (Hair et al., 2010). Principle component analysis in the method used for extraction in SPSS.

Factor analysis was performed and resulted in elimination of a number of dimensions, which were extracted under each construct. Factor analysis identify the items included in the constructs more clearly it actually ensures that the relevant factors (items) are bundled together correctly. Loadings range acceptable from the literature is usually greater than 0.5, however, some studies tend to use lower loadings when necessary. This could be because there is no general principle regarding acceptable factor loadings, some researcher go down to ignoring loadings less than 0.3. In this research, the cutting edge was chosen to be as most of the literature reviewed, which is greater than 0.5.

The factor loadings in the confirmatory factor analysis ranged from 0.748 to 0.788 for

PE; from 0.60 to 0.857 for EE, from 0.51 to 0.79 for FC, from 0.564 to 0.783 for BI, from 0.5 to 0.729 for Internet experience/Internet exposure, from 0.513 to 0.713 for privacy attitudes and concerns, from 0.501 to 0.693 for trust, for social Influence 0.899 for both items, from 0.904 for satisfaction of medical care. Since each factor loading on each item was more than 0.50, the convergent validity of the constructs was established (Hair et al., 2010). Factor analysis thereby has reworded or excluded items used in construct measurements. Which confirms the validity of the used scales for further analysis. Furthermore, missing values are automatically treated in the SPSS package used by excluding them from regressions and in factor analysis (factor loadings of constructs are included in Appendix C).

Construct validity was evaluated through measuring convergent validity which refers to how well different scales of items indicate the same or similar constructs, and how well multiple measures of the same construct agree with each other (Kerlinger, 1986). Content validity was established through the pilot study with eHealth experts and researchers as well as from the literature.

Hypotheses may suggest positive, negative, or no significant associations between constructs. In examining the relationship between a measure of one construct to the other observed variables indicating other constructs, it is expected that their empirical association to parallel the theoretically specified associations. To the extent they do, construct validity exists (Kerlinger, 1986).

6.4.4 – Frequency Distribution (Quantitative Results)

Frequency distribution analysis helps in a simple to explore many data sets. It recasts them in a way that counts the frequency (number of times) that certain things happen, or to find ways of displaying that information (Robson C., 2002). In this research, frequency tests of many variables were carried out. This was done to explore the data trends available. Frequencies here will help in understanding issues like, number of people having internet access form home, work or other places; number of people who used the Internet to search for information regarding their health condition or for others etc. These frequencies help give a clearer picture of the characteristics of the data sate (sample chosen). This helps to deepen the understanding of the dataset, compare it with different cultures, and also correlate it with other variables through other tests. Next demographics data are presented followed by testing the research model hypotheses.

6.4.5 - Demographic Descriptive Results

The research sample consisted (N = 402; 190 men and 162 women, Mean Age=30.5).

All respondents had the Egyptian nationality. One hundred and ninety participants (47.5%) were males while 162 participants (40.5%) were females and 58 participants (12%) didn't specify their gender represented in figure 6.1 below. The home town of respondents was found to be as follows: 95 participants (23.8%) were from Alexandria, 187 participants (46.8%) were from Cairo, 32 participants (8%) were from Giza while 38 participants (9.5%) were from other governorates as represented in figure 6.2 below.

Regarding income level per month: Out of 402 respondents the major clusters here were those with average monthly income less than 2000 Egyptian pounds (EGP or L.E.) accounted for 42% of the sample, income range of 2000-4000 EGP accounted for 25.2 % of the sample (nearly one quarter) going down to 12.6% accounted for income range from 4000-6000. Specifically, 139 participants (34.8%) had monthly income less than 2,000 EGP, 84 participants (21%) had monthly income of 2,000 - < 4,000 EGP, 42 participants (10.5%) had monthly income of 4,000 - < 6,000 L.E., 25 participants (6.3%) had monthly income of 6,000 - < 10,000 L.E., 11 participants (2.8%) had monthly income of 10,000 - 20,000 L.E. while 11 participants (2.8%) had monthly income > 20,000 EGP. Fifteen participants (3.8%) were students while 73 participants (18.3%) didn't answer as shown in figure 6.3 below.

In this research marital status was found to be as follows: 179 participants (44.8%) were single, 113 participants (28.3%) were married, 54 participants (13.5%) had children, 4 participants (1%) were separated and 4 participants (1%) were widowed. Forty-six participants (11.5%) didn't answer as shown in figure 6.4 below.

Age was found to be distributed as follows: 29 participants (7.3%) aged from 18 – 20 years, 173 participants (43.3%) aged from 21 – <30 years, 118 participants (29.6%) aged from 30 – <40 years, 28 participants (7%) aged from 40 – <50 years, six participants (1.5%) aged from 50 – <60 years and three participants (0.8%) aged 60 years or above. However, forty-three participants (10.8%) didn't answer as shown in figure 6.5 below.

Educational level was sometimes found from the literature to effect the acceptance of eHealth which was found to be distributed as follows: Ten participants (2.5%) went to some college but with no degree, 98 participants (24.5%) had post-graduate degrees, 208 participants (52%) were Bachelor degree holders, 26 participants (6.5%) had a high school degree or equivalent while 14 participants (3.5%) were students and 44 participants (11%) didn't answer (see figure 6.6. below). Employment status among respondents was found to be as follows: 311 participants (77.8%) were employed, seven participants (1.8%) were unemployed, 11 participants (2.8%) were retired and 28 participants (7%) were studying, however 43 participants (10.8%) didn't answer as seen below in figure 6.7. Data for employment status are presented in figure 6.7 and employment sectors are presented in table (6.2) and figure (6.8) respectively below.

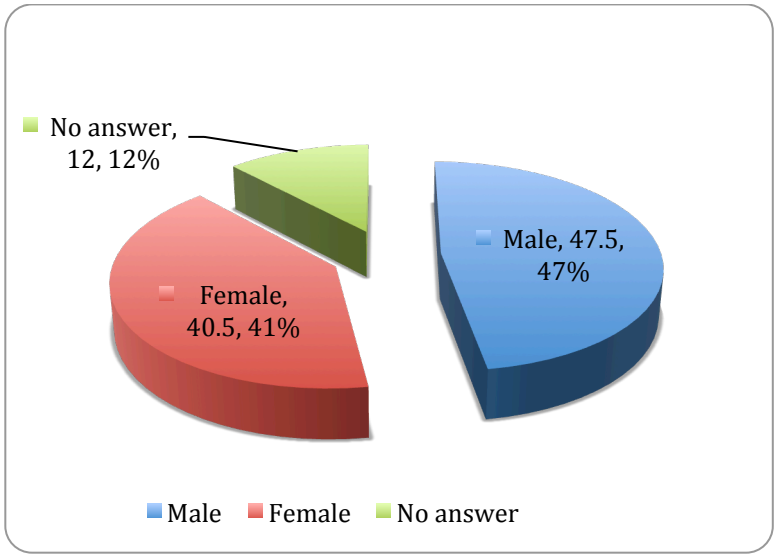


Figure (6.1): Pie chart representing gender distributions in the study sample.

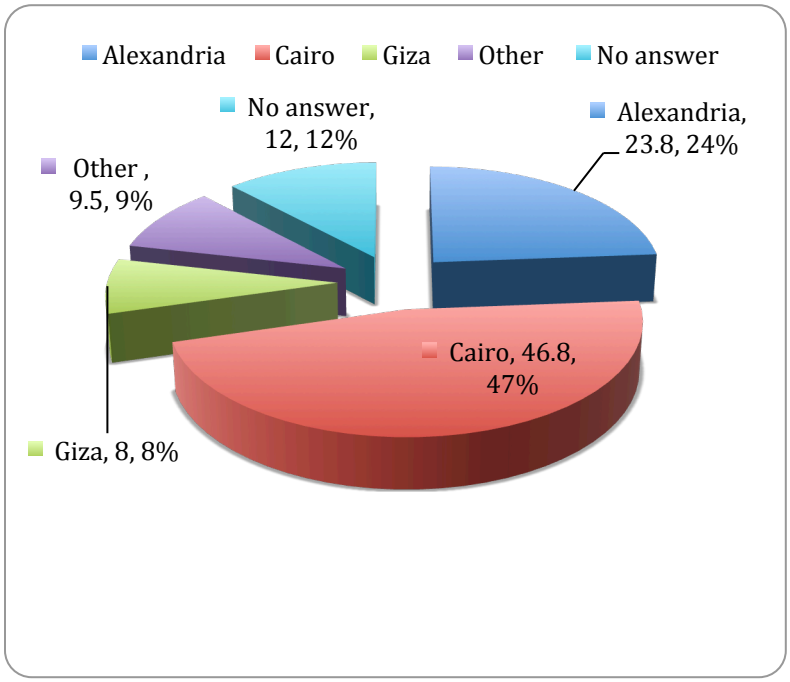


Figure (6.2): Pie chart representing governorates distribution in the study sample

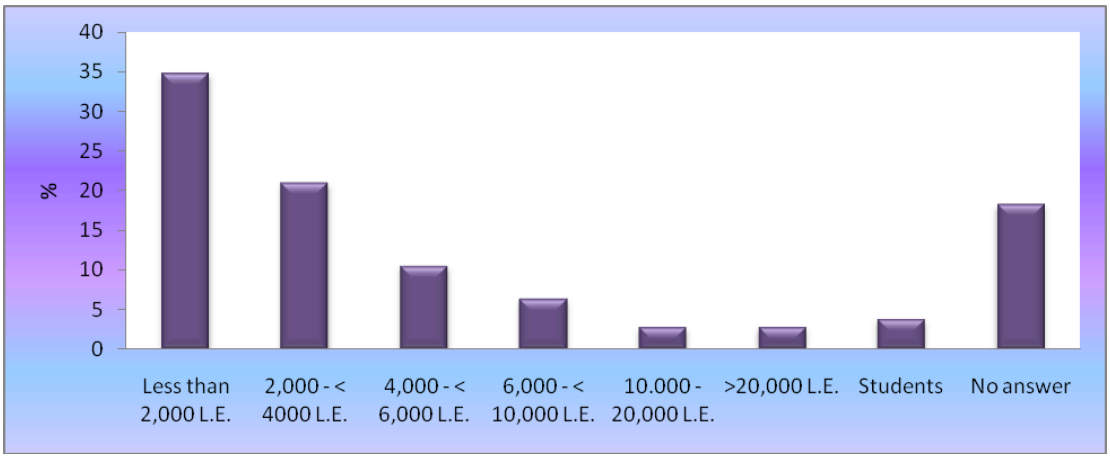


Figure (6.3): Bar chart representing monthly income in the study sample

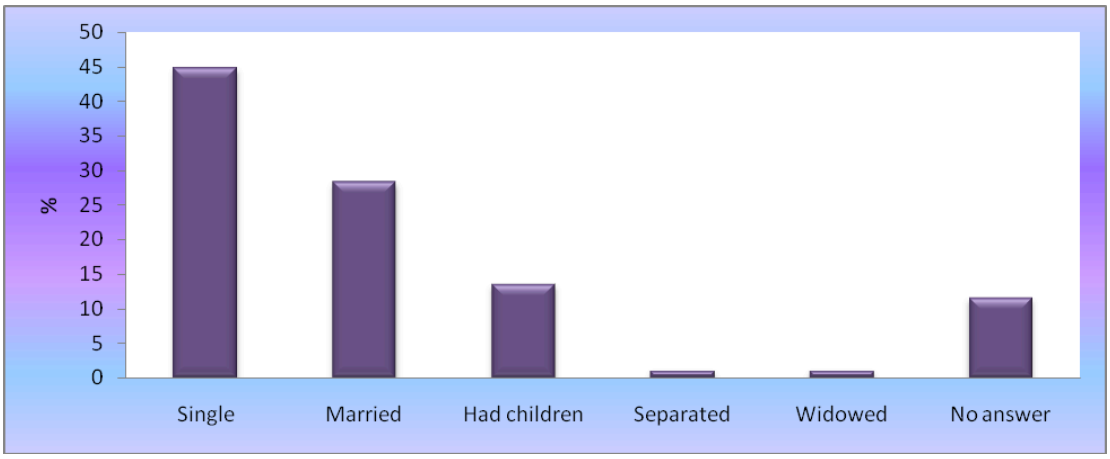


Figure (6.4): Bar chart representing marital status in the study sample

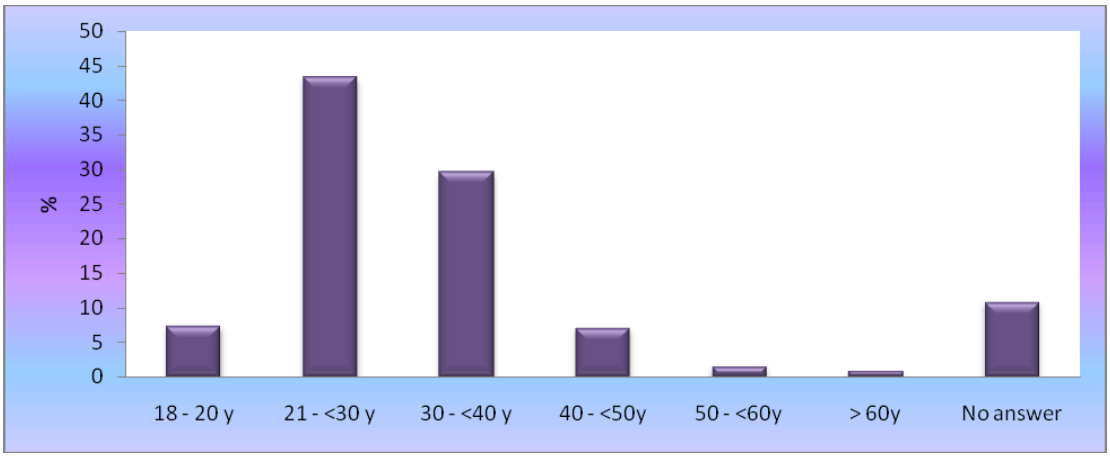
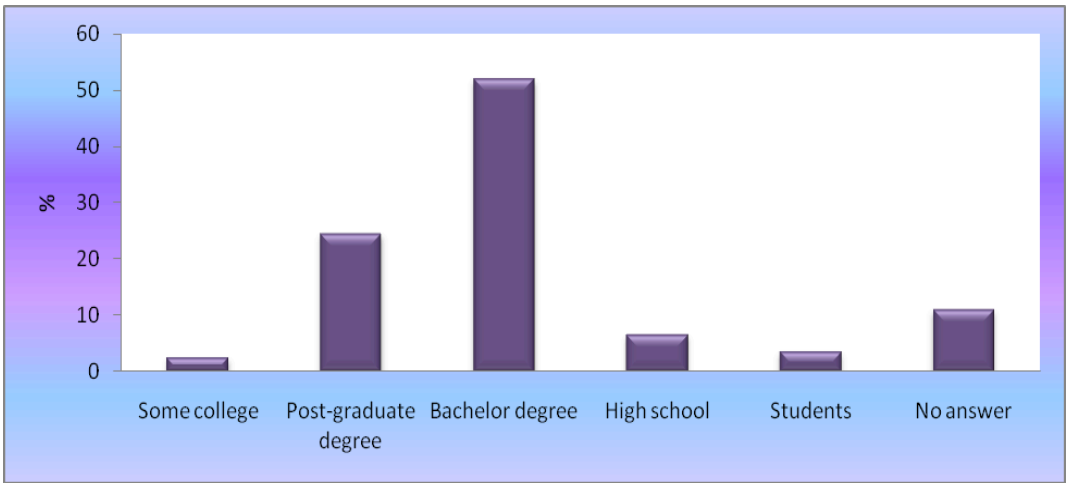


Figure (6.5): Bar chart representing age categories in the study sample



Above Figure (6.6): Bar chart representing educational level in the study sample

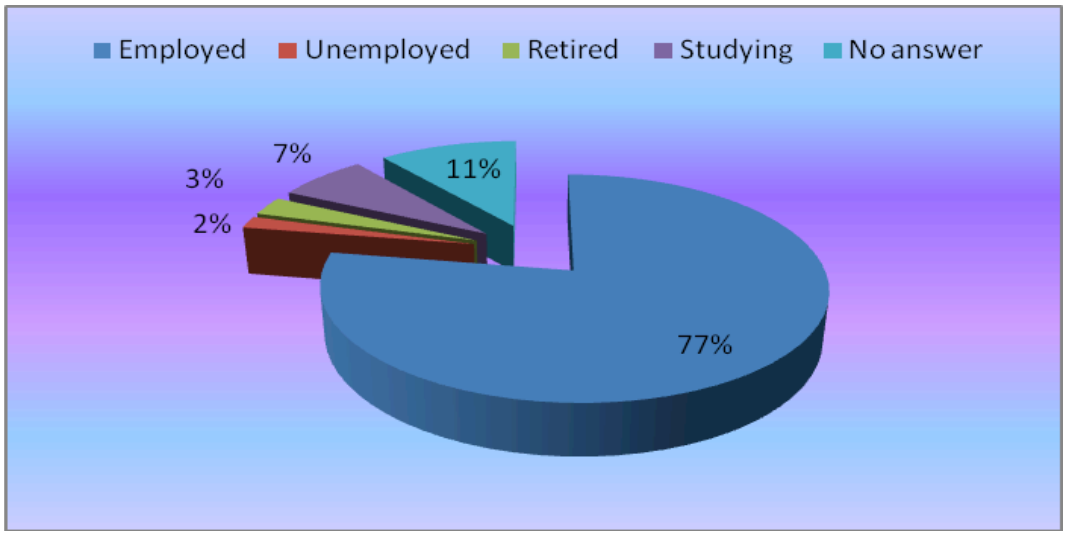


Figure (6.7): Pie chart representing employment status in the study sample.

Table (6.2): Frequencies (n) and percentages (%) of different employment sectors for respondents.

Employment sector	n	%
Education	46	11.5
Engineering	25	6.3
Computer Science	31	7.8
Finance/Banking	46	11.5
Trade/Export/Import	15	3.8
Manufacturing	6	1.5
Media	5	1.3
Communications	10	2.5
Medicine	66	16.5

Science (Geology, Chemical, Petroleum)	2	0.5
Maritime	4	1.0
Service Industry	10	2.5
Military Force	2	0.5
Information Technology/Information Systems	23	5.8
Pharmaceutical	1	0.3
Business Administration	28	7.0
Automotive	2	0.5
Student	5	1.3
Other	20	5.0
No answer	53	13.3

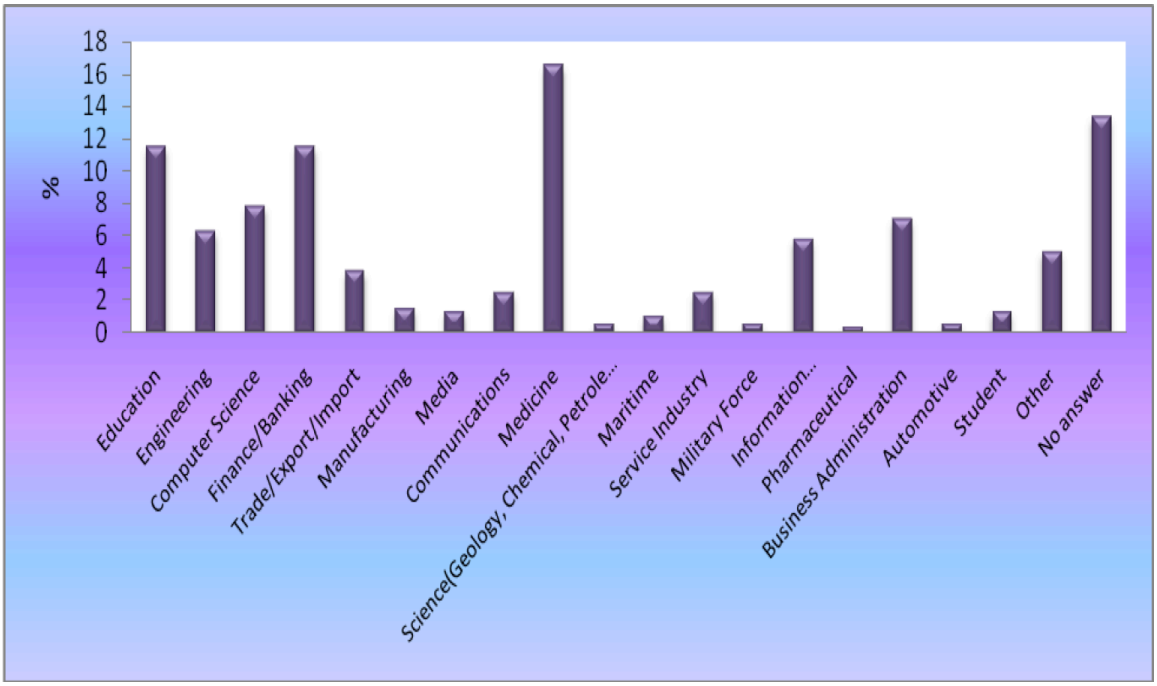


Figure (6.8): Bar chart representing employment sectors in the study sample

The following section describes the ease of modern electronic equipment at home and work. Results of questions related to this part of the survey are presented in table (6.3) and figure (6.9).

Ease of use of electronic equipment at home/work

A high percentage of respondents specified that it was very simple to use the modern electronic equipment in the survey. Respondents were asked to rate their ease of use on a scale from very simple to very difficult. The simplest equipment (highest % of very simple) was the mobile phone (77.8%) followed by PC (72.5%). The most difficult use for equipment (highest % of very

difficult) were the DVD player (1.5%) and scanner (1.5%). Digital pocket diary was the most unused equipment (38%).

Table (6.3): Ease of use of modern electronic equipment at home/work

Ease of use of modern equipment	Very simple		Fairly simple		Somewhat simple		Neutral		Somewhat difficult		Rather difficult		Very difficult		N/A	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Equipment																
Mobile phone	311	77.8	66	16.5	16	4	5	1.3	0	0	0	0	1	0.3	0	0
Digital diary	88	22	52	13	36	9	31	7.8	12	3	6	1.5	3	0.8	152	38
Digital camera	198	49.5	91	22.8	24	6	21	5.3	9	2.3	4	1	1	0.3	49	12.3
Digital alarm	236	59	52	13	14	3.5	14	3.5	5	1.3	0	0	3	0.8	68	17
DVD player	178	44.5	67	16.8	28	7	25	6.3	9	2.3	1	0.3	6	1.5	73	18.3
Microwave	201	50.3	69	17.3	26	6.5	29	7.3	9	2.3	0	0	2	0.5	57	14.3
PC	290	72.5	80	20	11	2.8	9	2.3	0	0	0	0	0	0	6	1.5
Laptop/Notebook	251	62.8	92	23	18	4.5	6	1.5	2	0.5	3	0.8	0	0	26	6.5
Printer	217	54.3	87	21.8	31	7.8	17	4.3	6	1.5	1	0.3	0	0	38	9.5
Scanner	155	38.3	84	21	34	8.5	20	5	15	3.8	0	0	6	1.5	81	20.3

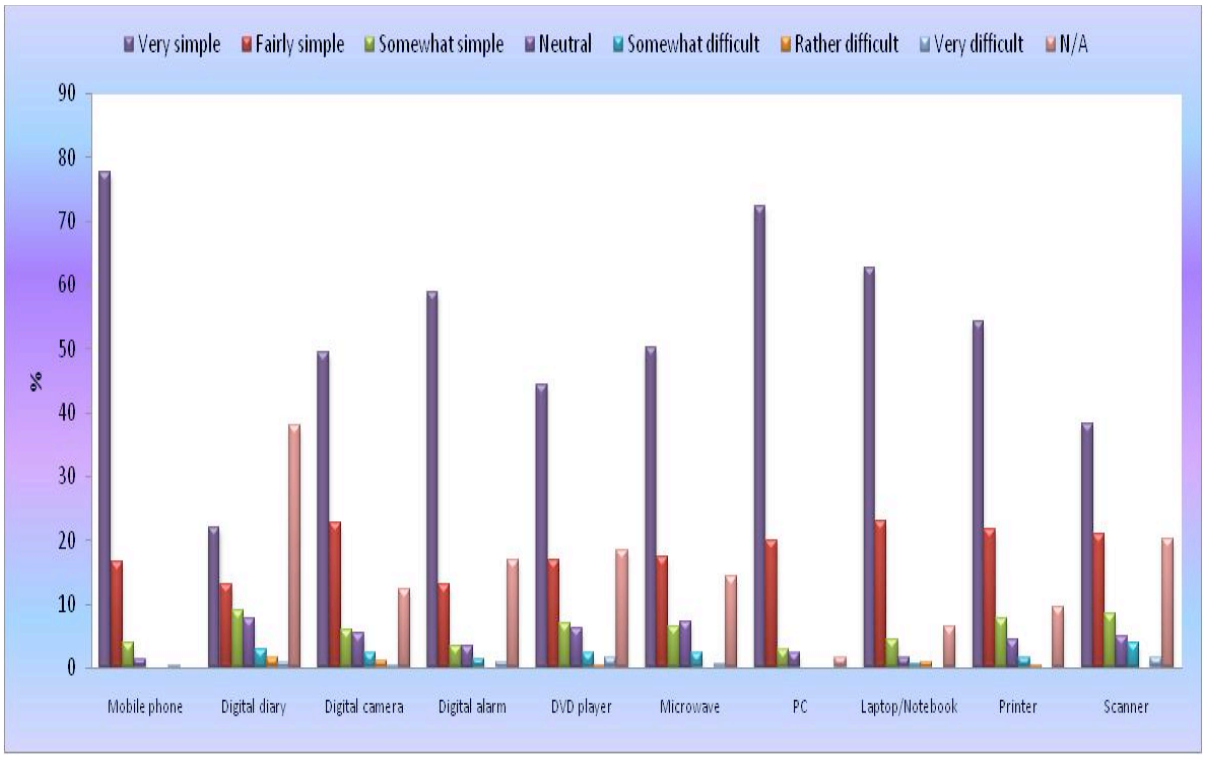


Figure 6.9: ease of use of modern electronic equipment

Personal Internet Usage Characteristics

Frequencies for Internet access places have shown that 91 % of the sample said that they access the Internet from home whereas only 4.5 % don't have Internet access at home. The question asked to the participants was "Where do you access the Internet from?". The question on the "Average Internet usage/day in hours" have shown that the mean and standard deviation values of Internet usage/day were 5.4 ± 3.7 hours/day with a minimum of 1 hour/day and a maximum of 24 hours/day.

Participants were also asked a question about what purposes do they use the Internet for and how frequent they were given options to choose from and specify their frequency of use on a Lickert scale starting from extremely often, very often, somewhat often, neutral, not very often and not at all, his was particularly for the compute/Interne exposure constructs. The question was "How often do you use the Internet for the following different purposes? Results show that the highest percentages of participants extremely often use the Internet for communication with others (54%). The most unused purpose was buying products online (39.8%); 22% use the Internet extremely often for browsing for health information and 14.8% used the Internet extremely often for health related activities.

On the other hand 6% chose not at all regarding browsing for health information and a rather larger percentage 27.8% also chose not at all for using the Internet for health related activities (see tables 6.5 and 6.6 below). This could be due the in availability of eHealth services in Egypt albeit a high percentage 82% expressed that they did use the Internet to search about an illness for themselves or someone else and 213 participants (53.3%) used health websites that provide health advice through Internet pharmacies and hospitals. Details of statistics for the research models construct and it's testing against the original UTAUT extension will be discussed in Chapter 7.

Table (6.4): Internet access places

Internet access	Home		Work		Internet café		Public places		None	
	n	%	n	%	n	%	n	%	n	%
	367	91.8	260	65	109	27.3	133	33.3	2	0.5

Table (6.5): Frequency of Internet usage for different purposes

Purpose	Extremely often		Very often		Quite often		Not very often		Not at all	
	n	%	n	%	n	%	n	%	n	%
Entertainment	103	25.8	79	19.8	103	25.8	72	18	25	6.3
Education	114	28.5	132	33	84	21	39	9.8	13	3.3
Work-related research	122	30.5	92	23	53	13.3	57	14.3	56	14
Personal finance	40	10	43	10.8	66	16.5	79	19.8	154	38.5
Current events	155	38.8	114	28.5	68	17	35	8.8	10	2.5
Travel-related search	57	14.3	47	11.8	69	17.3	77	19.3	65	16.3
Product information gathering	101	25.3	100	25	92	23	49	12.3	39	9.8
Communicating with others	216	54	75	18.8	46	11.5	22	5.5	20	5
Buy products online	33	8.3	41	10.3	61	15.3	83	20.8	159	39.8
Buy services online	26	6.5	47	11.8	59	14.8	90	22.5	156	39
Browsing for health information	88	22	83	20.8	108	27	76	19	24	6
Using health-related activities	59	14.8	49	12.3	70	17.5	86	21.5	111	27.8
Other	13	3.3	7	1.8	13	3.3	3	0.8	129	32.3

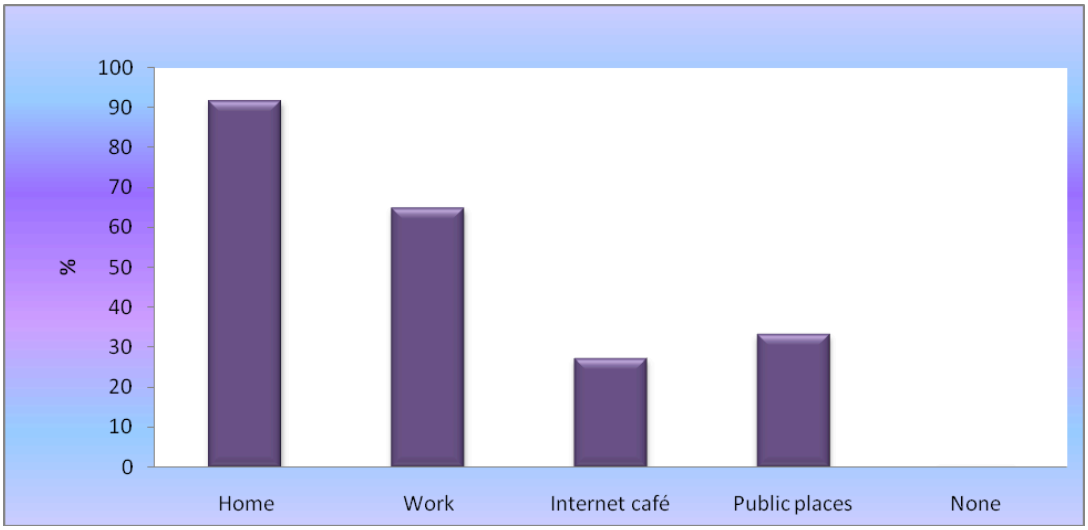


Figure 6.10: Internet access places

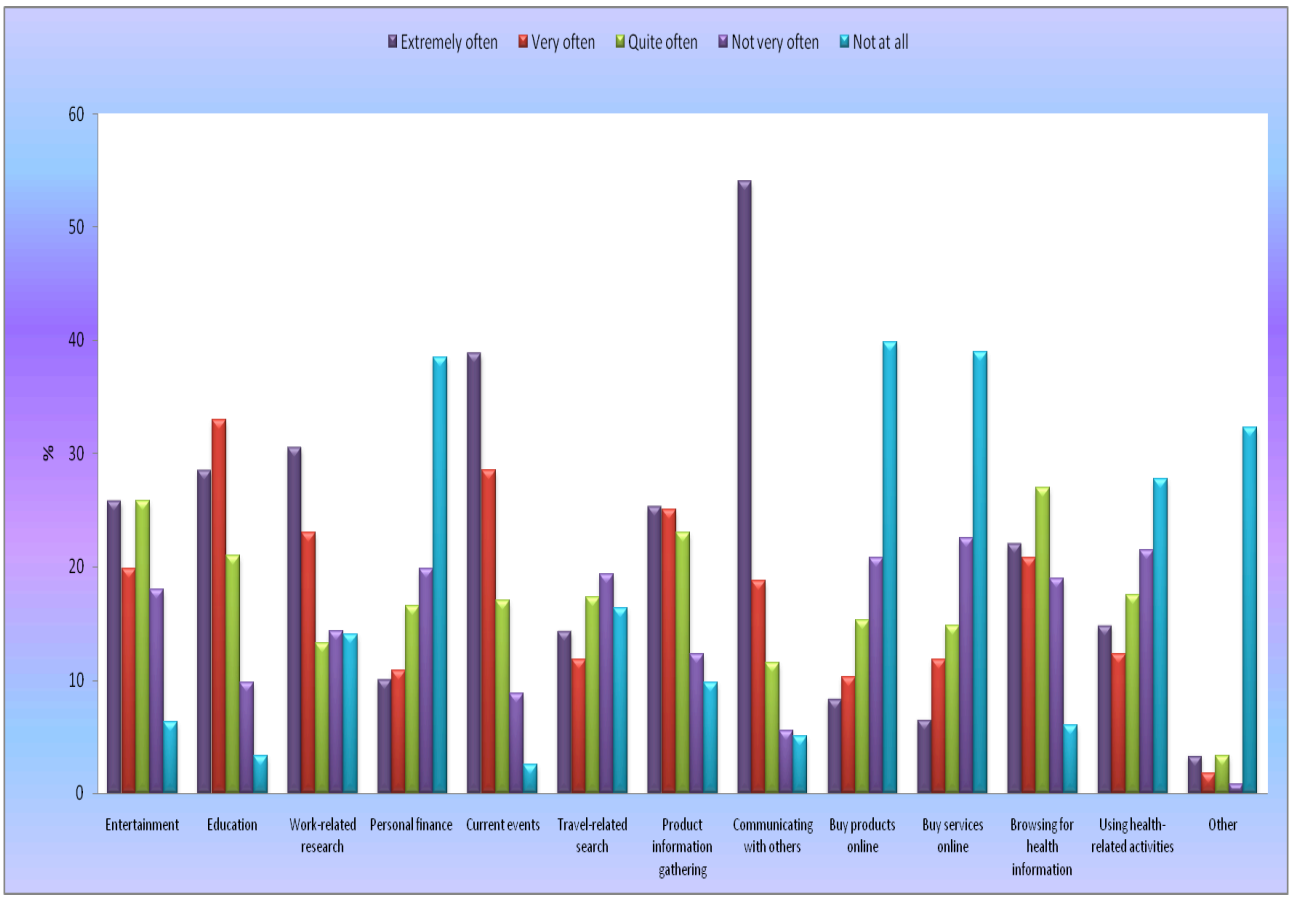


Figure 6.11: Frequencies for use of the Internet for various purposes

In summary of descriptive results regarding use of eHealth have shown that 213 participants (53.3%) used health websites that provide health advice through hospitals, or Internet pharmacies, 146 participants (36.5%) heard about the term eHealth, 299 participants (57.3%) chose the phrase: asking for health advice using health organizations over the Internet, when they were asked "Which phrase best describes the term eHealth?" and finally 276 participants (69%) think that health information should be private when they were asked a (Yes/No/Not sure) question: Do you think your health information should be private? (Please see table 6.6 below). Further analysis where questions will be tested against the search conceptual model constructs and the established hypothesis will be described in coming sections as well as model fit tests will be discussed.

Table (6.6): Summarized eHealth descriptive facts

Electronic health facts	n	%
Use of the internet to search for information about a health condition	313	78.3
Use of health websites that provide health advice	213	53.3
Have you ever heard of the term eHealth/Internet Health	146	36.5
Which of these phrases best describes eHealth?		
Health records on a Doctor's computer	84	21
Asking for health advice and using pharmacies over the internet	176	44
Asking for health advice and using health organizations over the internet	229	57.3
Computerized health records in hospitals	115	28.8
Electronic health devices used in clinics or hospitals	81	20.3
Devices at home to help you with your health	87	21.8
Applications downloaded to your mobile phone	104	26
Do u think your Health information should be private?		
Yes	276	69
No	61	15.3
Not sure	46	11.5

6.4.6 Testing the Proposed Research Model Hypotheses

Testing the research hypotheses was performed using SPSS, AMOS 20.0.0 (Build 817). This was used to conduct regression analysis to test the hypotheses. This tool helped in deriving the partial models for the causal relationship among the constructs. Partial models incorporate unique effects of individual measurements items and calculate both direct and indirect effects within a model therefore making it useful in assessing models (Wilson and Lankton, 2012; Beekens 2011).

Hypothesis 1 was confirmed in this study which was PE might have an effect on acceptance of eHealth (BI). To test the hypothesis behavioural intention (BI) was used as the dependent construct and performance expectancy (PE) as the independent construct in the model, the results display good fit to data display good fit to data (x^2 = 2.525, degrees of freedom (df) = 5, P-value = 0185). The standardized regression weight was 0.219 for PE. There was a direct correlation between PE and BI (Squared multiple correlation coefficient for BI = 0.485). The hypothesis was not rejected (P-value > 0.05) showing that PE will have an effect on BI.

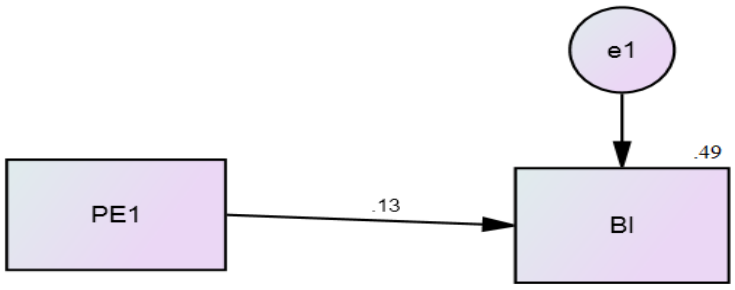


Figure (6.12): Path diagram for the effect of PE on BI

Testing of hypothesis 2: EE might have an effect on the acceptance of eHealth (BI). Using Behavioural Intention (BI) as the dependent construct and Effort Expectancy (EE) as the independent construct in the model, the results display a good fit to data (x2 = 1.223, degrees of freedom (df) = 1, P-value = 0.269). The standardized regression weights were 0.773 and 0.191 for factors EE1 and EE2, respectively. There was a direct correlation between EE and BI (Squared multiple correlation coefficient for BI = 0.561). The hypothesis was not rejected (P-value > 0.05) showing that Effort expectancy directly influences (BI), meaning that the higher a person's EE the higher the behaviour intention to use eHealth technology.

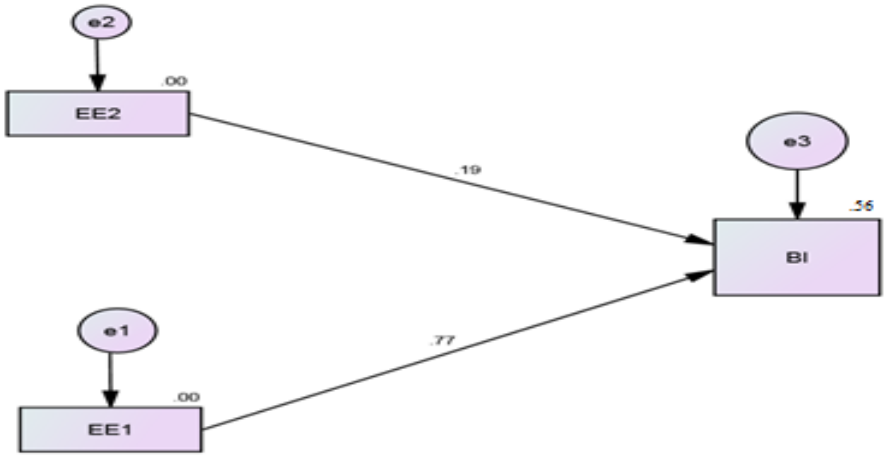


Figure (6.13): Path diagram for the effect of EE on BI

Hypothesis 3 was not rejected which is Facilitating Conditions (FC) might affect the acceptance of eHealth (BI). In this hypothesis, using behavioural intention (BI) as the

dependent variable and facilitating conditions (FC) as the independent variable in the model, the results display a good fit to data (x2 = 10.294, degrees of freedom (df) = 6, P-value = 0.113). The standardized regression weights were 0.237, 0.184, -0.136 and -0.083 for factors FC1, FC2, FC3 and FC4, respectively. FC had a direct correlation with BI (Squared multiple correlation coefficient for BI = 0.427). The hypothesis was not rejected (P-value > 0.05) therefore, facilitating conditions directly affects behavioural intention (BI).

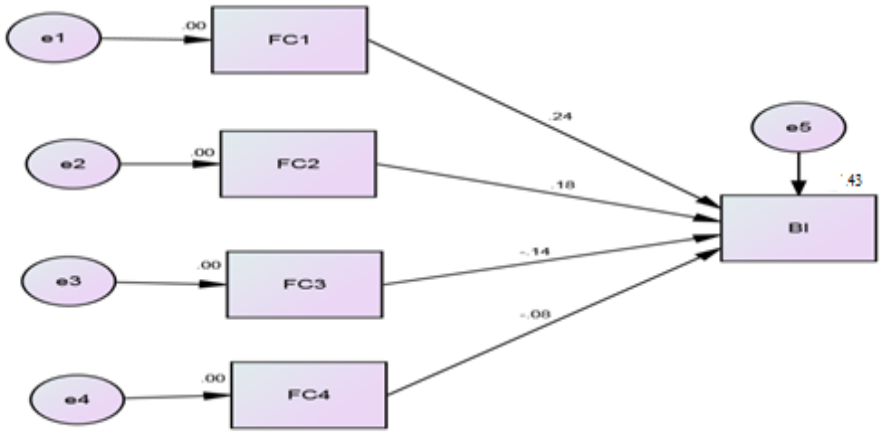


Figure (6.14): Path diagram for the effect of FC on BI

A non-confirmation of hypothesis 4a was found, which is social influence, may have a positive impact on (BI). Using behavioural intention (BI) as the dependent construct and social influence (SI) as the independent construct in the model, the results display a poor fit to data (x2 = 23.459, degrees of freedom (df) = 17, P-value < 0.001). The standardized regression weight was -0.017. This shows that the hypothesis was rejected (P-value < 0.05). Therefore, social influence (SI) doesn't affect behavioural intention (BI). Furthermore testing the antecedent factor satisfaction with medical care on social influence exerted from medical practitioners on patients (internet users) summarized in hypothesis 4b: satisfaction with medical care might have a positive effect on SI, which will affect BI. A non-confirmation of this hypothesis was also experienced when using behavioral intention (BI) as the dependent construct, satisfaction with medical care and social Influence (SI) as the independent constructs in the model, the results display a poor fit to data (x2 = 13.335, degrees of freedom (df) = 1, P-value < 0.001). The standardized regression weights were 0.834 for satisfaction with medical care and -0.017 for social influence. Therefore, The hypothesis was rejected (P-value <

0.05) showing that satisfaction with medical care doesn't affect social influence (SI), which in turn doesn't affect behavioral intention (BI).

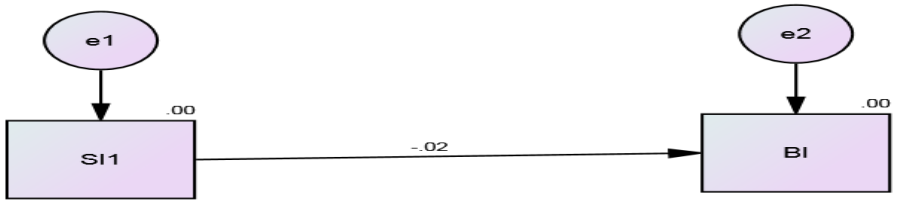


Figure (6.15): Path diagram for the effect of SI on BI

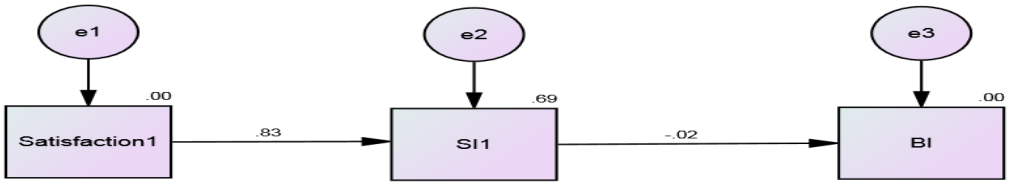


Figure (6.16): Path diagram for the effect of Satisfaction with medical care on SI affecting BI

Regarding hypothesis 5 in general which are users with higher PE and EE have higher BI. Hypothesis was: Higher levels of EE lead to higher levels of PE. In this case using performance expectancy (PE) as the dependent construct and effort expectancy (EE) as the independent construct in the model, the results display a good fit to data (x2 = 1.336, degrees of freedom (df) = 1, P-value = 0.248) meaning that EE had a statistically significant correlation with PE. The standardized regression weights were 0.454 and 0.234 EE1 and EE2, respectively. There was a direct correlation between EE and PE (Squared multiple correlation coefficient for PE = 0.558). The hypothesis was not rejected (P-value > 0.05) showing that EE is directly correlated with PE. Therefore it can be concluded that higher levels of PE and higher levels of EE positively affect BI.

Figure (6.17): Path diagram for the effect of EE on PE

Testing Hypothesis 6 which was also broken down to 6a, 6b and 6c: H6a: High privacy concerns negatively affect (BI). In this case using Behavioural Intention (BI) as the dependent construct and attitudes to online privacy as the independent construct in the model, the results display good fit to data (x2 = 1.804, degrees of freedom (df) = 1, P-value = 0.179). The standardized regression weights were 0.206 and 0.239 for Privacy1 and Privacy 2, respectively. There was an inverse correlation between Privacy and BI (Squared multiple correlation coefficient for BI = -0.603). The hypothesis was not rejected (P-value > 0.05) showing that high privacy concerns depicted in attitudes to online privacy negatively affects BI.

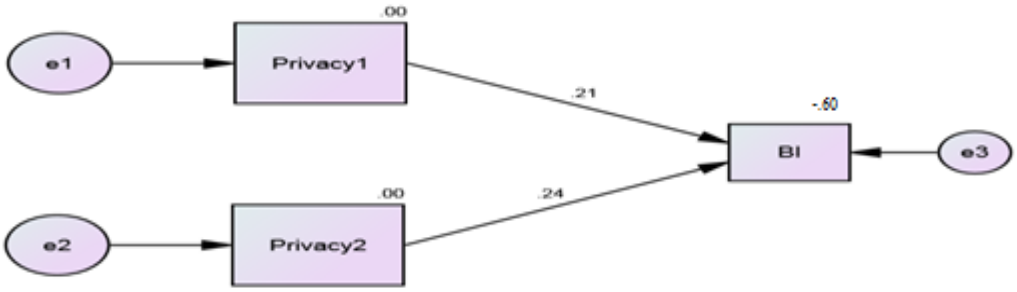


Figure (6.18): Path diagram for the effect of Privacy on BI

When testing H6b, which is high privacy concerns, might affect level of trust. Using Trust as the dependent construct and Privacy as the independent construct in the model, the results display poor fit to data (x2 = 24.490, degrees of freedom (df) = 4, P-value < 0.001). The standardized regression weights were 0.936 and -0.081 for

Privacy1 and Privacy 2, respectively. The hypothesis was rejected (P-value < 0.05) so high privacy concerns don't affect level of trust.

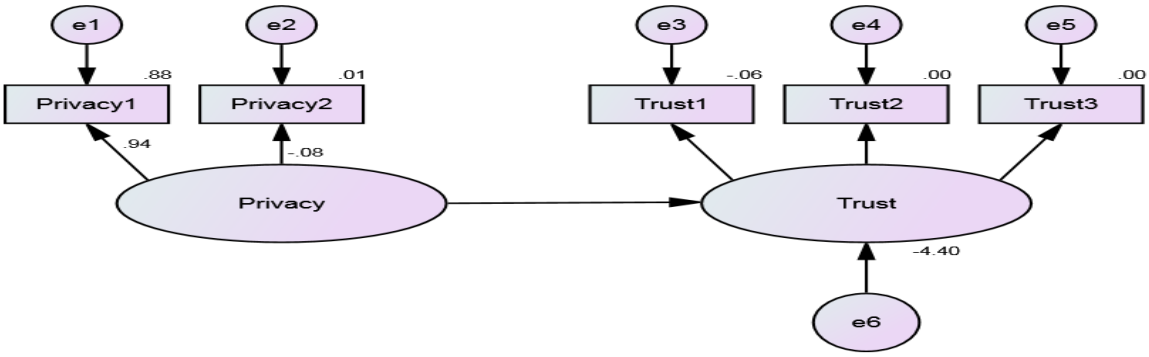


Figure (6.19): Path diagram for the effect of Privacy on Trust

However, regarding H6c where Privacy concerns might negatively affect PE. In this case using Performance expectancy (PE) as the dependent construct and privacy as the independent construct in the model, the results display good fit to data (x2 = 1.921, degrees of freedom (df) = 1, P-value = 0.166). The standardized regression weights were 0.368 and 0.094 for privacy1 and privacy 2, respectively. There was an inverse correlation between Privacy and PE (Squared multiple correlation coefficient for PE = -0.496). The hypothesis was not rejected (P-value > 0.05) showing that privacy concerns might negatively affect PE.

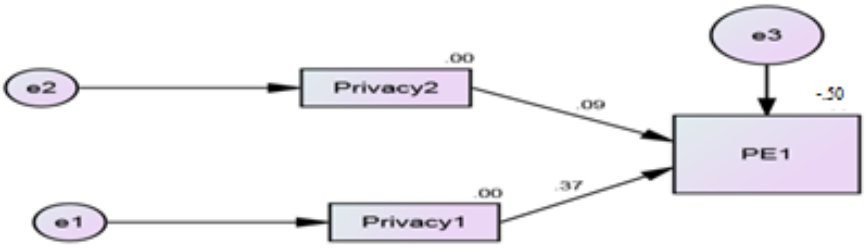


Figure (6.20): Path diagram for the effect of Privacy on PE

Hypothesis 7a was also tested which is; there is a positive relationship between trust and behavioural intentions (BI). In this case using Behavioural Intention (BI) as the dependent construct and Trust as the independent construct in the model, the results

display good fit to data (x2 = 0.330, degrees of freedom (df) = 3, P-value = 0.954). The standardized regression weights were 0.319, 0.108 and -0.058 for Trust 1 Trust 2 and Trust 3, respectively. There was a direct correlation between Trust and BI (Squared multiple correlation coefficient for BI = 0.538). The hypothesis was not rejected (P-value > 0.05) showing a positive relationship between trust and BI.

Hypothesis 7b, which was: higher levels of trust may affect PE positively. In this case using performance expectancy (PE) as the dependent construct and trust as the independent construct in the model, the results display good fit to data (x2 = 0.372, degrees of freedom (df) = 3, P-value = 0.946). There was direct correlation between Trust and PE (Squared multiple correlation coefficient for PE = 0.550). The standardized regression weights were 0.507, 0.177 and 0.018 for Trust 1 Trust 2 and Trust 3, respectively. The hypothesis was not rejected (P-value > 0.05) showing that higher levels of trust affect PE positively.

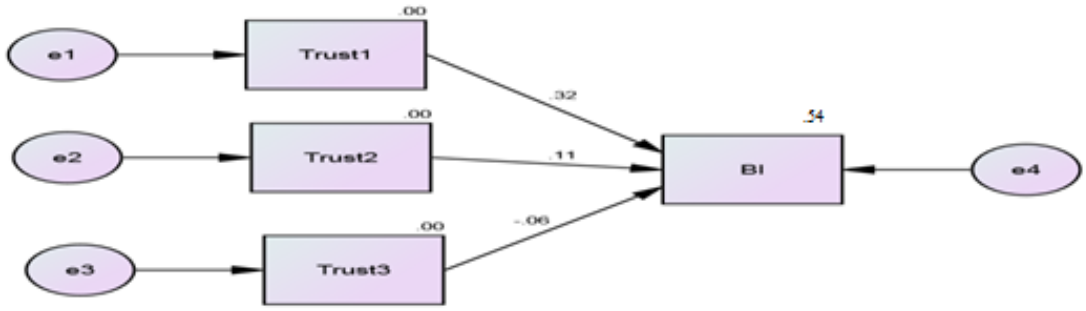


Figure (6.21): Path diagram for the effect of Trust on BI

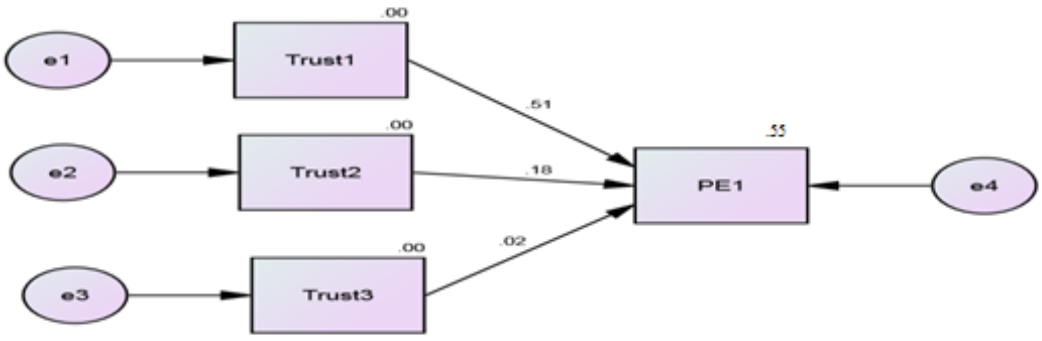


Figure (6.22): Path diagram for the effect of Trust on PE

Regarding hypothesis 8a, which is Internet experience and exposure (ID), may have a positive effect on BI. In this case using behavioural intention (BI) as the dependent construct and Internet experience and exposure as the independent construct (ID) in the model, the results display good fit to data (x2 = 1.844, degrees of freedom (df) = 1, P-value = 0.175). The standardized regression weights were 0.059 and -0.002 for ID 1 and ID 2, respectively. There was direct correlation between ID and BI (Squared multiple correlation coefficient for PE = 0.404). The hypothesis was not rejected (P-value > 0.05) showing Internet experience and exposure (ID) has a positive effect on BI.

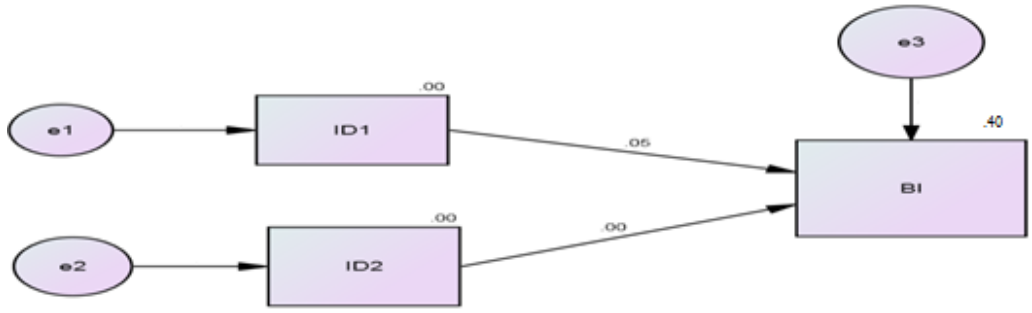


Figure (6.23): Path diagram for the effect of ID on BI

Testing Hypothesis 8b which was Internet experience and exposure (ID) might have an effect on privacy attitudes and concerns (PC) therefore using PC as the dependent construct and ID as the independent construct in the model, the results display good fit to data (x2 = 2.614, degrees of freedom (df) = 2, P-value = 0.271). The standardized regression weights were 0.865 and -0.008 for ID 1 and ID 2, respectively. There was direct correlation between ID and PC (Squared multiple correlation coefficient for Trust = 0.412). Therefore, the hypothesis was not rejected (P-value > 0.05) so Internet experience and exposure might have a positive effect on (PC) meaning that the higher the Internet experience the more the privacy concerns.

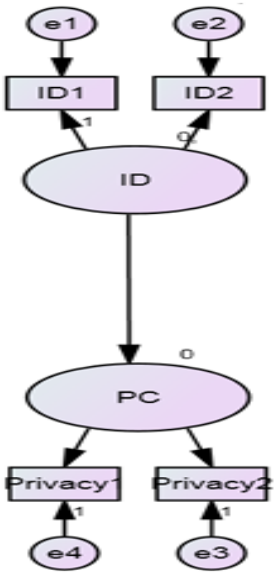


Figure (6.24): Path diagram for the effect of ID on (PC)

Testing hypothesis 8c was tested using trust as the dependent construct and Internet experience and exposure (ID) as the independent construct in the model. The results display good fit to data (x2 = 7.664, degrees of freedom (df) = 4, P-value = 0.105). The standardized regression weights were 0.564 and -0.133 for ID 1 and ID 2, respectively. There was direct correlation between ID and Trust (Squared multiple correlation coefficient for Trust = 0.865). Therefore, the hypothesis was not rejected (P-value > 0.05) so Internet experience and exposure has a positive effect on Trust.

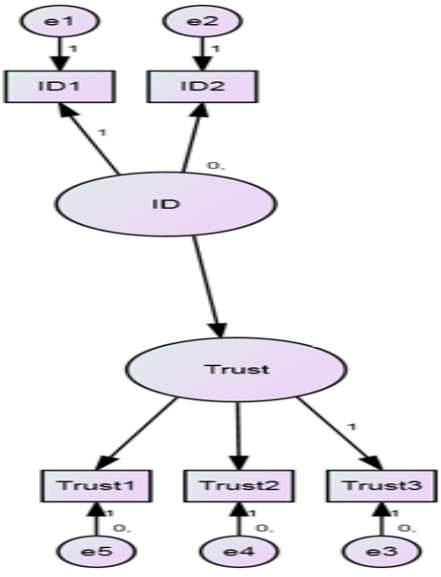


Figure (6.25): Path diagram for the effect of ID on Trust

Finally, hypothesis 8d was tested where ID might have an effect on EE, an interesting positive effect was found between both constructs. In this case using effort expectancy (EE) as the dependent construct and Internet experience and exposure (ID) as the independent construct in the model, the results display good fit to data (x2 = 2.204, degrees of freedom (df) = 1, P-value = 0.138). The standardized regression weights were 0.361 and -0248 for ID 1 and ID 2, respectively. There was direct correlation between ID and EE (Squared multiple correlation coefficient for Trust = 0.350). Therefore, the hypothesis was not rejected (P-value > 0.05) showing ID might have a positive effect on EE; meaning that people with Internet experience and exposure perceive that eHealth is easy to use (high effort expectancy).

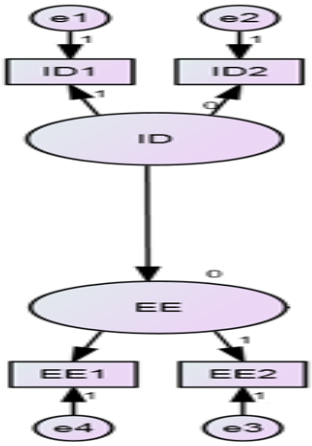


Figure (6.26): Path diagram for the effect of ID on (EE)

6.5 Summary

While many studies have measured online privacy concerns, these have tended to focus on only the magnitude of concern, and requiring responses to items about violations to informational privacy. However, given the many dimensions of privacy there is a need to investigate the meaning of privacy in online transactions. This is done by studying people's online privacy concerns and attitudes when being online. In this research privacy concerns towards the provision of information online was therefore studied based on (Ackerman et al., 1999) who emphasized the importance of attitudes to online privacy, which in turn reflect privacy concerns also identified by (Jensen et al., 2005). Therefore it was preferred to understand the larger scope of the attitudes to online privacy generally, not specifically in eHealth. This was done to answer the research question on how do privacy concerns (attitudes to privacy online) and other technology acceptance factors might affect the acceptance of eHealth technologies.

Another reason for addressing privacy in a broad sense was because eHealth is planned to be an initiative and not implemented yet therefore it would be difficult to elicit attitude towards a service that is not readily available to users.

Results obtained from quantitative data have shown that all factors hypothesized to affect acceptance of eHealth have a significant effect on behavioral Intention except social Influence and satisfaction with medical care factors, which were found to be insignificant. Privacy attitudes and concerns were found to be inversely affecting behavioural intention to use eHealth (eHealth acceptance). Some common relationships was also found in qualitative data that supported findings form the quantitative results. Qualitative data was gathered through interviews with government officials, hospital managers and some doctors.

The next chapter “Discussion” discusses the reasons behind results that were found from this study. It also addresses evidence from literature supporting similar findings that were found in this thesis.

Chapter 7 – Discussion

The role of this discussion chapter is to present a discussion of the main findings of the quantitative and qualitative data collected for the purpose of this dissertation as well as addressing the implications and the contributions of the present research.

7.1 Introduction

Technology adoption has been studied in many ways. Some studies took the ‘‘process’’ approach and examined its in-depth process (Im et al., 2011) others focused on relationships among technology acceptance variables: UTAUT and TAM (both are technology acceptance models) that are examples of this.

The main objective of this thesis was to identify technology acceptance factors that have a significant effect on users’ behavioural intention towards eHealth technology and services. Since the research scope is eHealth acceptance, additional factors such as attitudes to online privacy, online trust, satisfaction with medical care and computer/Internet technology experience and exposure were added to the original UTAUT model. Most of the studies addressing technology acceptance factors focused on business settings or students populations (Ajzen, 1985; Davis, 1986, 1993; Venkatesh, et al., 2000, 2003).

However, in this thesis the focus was on the *Internet user* as an end-user of eHealth technologies and services (patient side). The existing gap in the literature has been therefore filled by this research. Studies to date focused on the technology acceptance of physicians (Chau and Hu, 2002; Hu et al., 2002; Chismar & Wiley-Patton, 2003) and those that focused on the patient side mainly constituted a meta-analysis and literature reviews of factors that affect patient acceptance. However such studies did not constitute actual results, implementation, or application of technology acceptance models with the addition of online privacy, online trust and Internet experience and exposure factors, which was done by this study.

There is an existing knowledge gap regarding public acceptance of eHealth technology in different contexts of use (ibid). This research therefore attempts to fill in this gap, which focused on *the attitudes* towards online privacy, apart from the legal and technical aspects of privacy. Some researchers emphasized that there is a need to know under which circumstances users would accept eHealth and medical technology.

In studies regarding IT acceptance, it was noted that there are antecedent factors related to the individual that affect the acceptance of the IT studied. Since antecedent factors have temporal precedence to system acceptance and occur independently of the model constructs, they may be applied to predict users' tendencies to accept the technology before the technology is actually implemented (Wilson and Lankton, 2012). Therefore there is no reason that the same can't be applied in the context of eHealth technology acceptance. Hence in this thesis, privacy concerns, online trust, satisfaction with medical care and Internet experience/exposure are treated as independent constructs besides those originating from UTAUT. These antecedents also undertook tests of significance with the other factors for a better understanding of the relationships among the model constructs in this thesis.

One of the purposes of this study were to examine the applicability of the UTAUT in explaining general users' acceptance of eHealth, and to determine factors and predictors that influence users' acceptance towards eHealth. The proposed research model named as "an Extension of UTAUT with privacy, trust and Internet experience and exposure factors" was developed based on the original UTAUT by (Venkatesh et al., 2003) which was originally developed from TAM (Davis, 1986). Data analysis has shown that the reliabilities of the constructs were above the cutting edge and the content validity was examined through the pilot study conducted.

The added variables were identified from the literature review and were tested as antecedents of the UTAUT original variables and direct predictors of acceptance (BI) shaping the proposed extension of the UTAUT in the eHealth acceptance domain.

The next section discusses the possible reasons for the results found with reference to the research question of this thesis. The original proposed research model was revised based on the Pearson correlation results including social influence and satisfaction with medical care despite their insignificantly found relationships with behavioural intention. The overall model fit including all relationships is found in section 7.4.

7.2 Answering the Research Question

The research question in this study is:

> *How do online attitudes to privacy and other technology acceptance factors affect the acceptance of eHealth in Egypt?*

According to the correlation results, there were significant relationships among the constructs drawn from the original UTAUT (performance expectancy PE, effort expectancy EE, facilitating conditions FC and behavioural intention) except the social influence construct (SI). There were also significant relationships between the UTAUT constructs and the added constructs: online privacy attitudes and concerns, online trust and Internet experience and exposure ID (except satisfaction with medical care). Hence, it was noted from the results that PE, EE, FC, privacy, trust and Internet experience and exposure factors are the factors that affect eHealth acceptance in this study on Egyptian Internet users.

Electronic health records and eHealth technology have great potential to improve the quality and safety in health care, however these improvements will only occur if physicians have access to key functions in these systems (Or and Karsh, 2010), approve using these systems and are convinced with its potential benefits. This research has focused on the user's side (patients) but however the researcher wanted to further gain some insight on the degree of applicability of eHealth from the managerial side (practitioners and governmental side).

This was done by interviews conducted with government officials at the MOHP, hospital managers and some doctors. The results have shown similar findings form both sides on some factors where both sides do agree that there is a considerable degree of usefulness (performance expectancy) to be gained from eHealth. Regarding effort expectancy, it was found that both parties acceptance increase due to their perceived effort expectancy and performance expectancy which was found from interview results.

Furthermore, privacy attitudes and concerns have shown similar impact from both sides towards acceptance however with greater negative effect from the user's side and this is explained perhaps because it is their data that is to be exchanged online. From the MOHP practitioners side, privacy issues are not of great concern as the majority of the interviewed parties specified that privacy is guaranteed and that medical data must be

kept private and this is mainly due to the nature of their job where medical data is a must to be confidential. Therefore the main concerns expressed for the physicians side, (people working under the MOHP) is that privacy is important and there is a need to reassure patients that eHealth transactions are handled privately. Also, there is a need for clear policies to be established when the eHealth initiative takes place. Practitioners have also specified that it is up to the user (patient) himself to decide or *trust* that there data is confidential just as their perceptions were when dealing with health services in an offline manner. The Hippocratic oath that practitioners swear at the medical school ensures this too as specified by most of the parties interviewed.

All of the parties have shown interest to use eHealth technologies especially with the availability of resources from their side, which explains the facilitating conditions factor's importance in technology acceptance that had a significant effect on behavioural intention. It was deduced that relevant computer skills/resources and Internet skills/resources are available and this was from their emphasis that they use the Internet connection on different devices and computers generally in research as well as when doing some consultations between each other.

7.3 Interaction Effects among Constructs

Results found from testing Hypothesis 1, which was performance expectancy might have a positive effect on behavioral intention (BI) have shown a significant relationship and the hypothesis was accepted. Consistent with Davis (1989), performance expectancy was found to have a significant impact on behavioural intention in this study. The significant relationship between PE and BI is also supported by (Wu et al., 2011) who explained it by that individuals who have certain positive attitudes toward the system would show a better satisfaction towards suing the systems.

The significant relationship found between performance expectancy and behavioural intention in this thesis, was explained by many researchers in the eHealth domain. A main reason is that patients might encounter using eHealth more and more frequently for treatments and self-management health care accompanying the growth of general ecommerce transactions and Internet dependence (Or and Karsh, 2009). Another reason is that users might see increased opportunities in using eHealth that empowers them to participate in information sharing and decision-making giving them more control and therefore contribute to the quality of health care.

Hypothesis 2, which was: effort expectancy (EE) might affect behavioural intention (BI) was also accepted in this study meaning that a significant relationship was found between EE and BI. However, the relationship between effort expectancy and behavioural intention is not present in the original TAM but many empirical studies

related to TAM found a significant relationship between perceived ease of use and behavioural intention (Wu et al, 2011). Furthermore the UTAUT (that was based on TAM too) includes this direct relationship between both EE and BI (Venkatesh et al., 2003; Holden and Karsh, 2010). The significant relationship found in this study between EE and BI in this study is therefore in line with the original UTAUT relationships (Venkatesh et al., 2003) and supported by those reported in the literature (Wu et al., 2011; Davis et al., 1989; Holden and Karsh, 2010).

This suggests that EE is important when subjects have no experience in using a new information technology/information system and they will likely use it if they feel that using the technology will be free of effort.

The significant relationship between EE and BI is also explained by, that users in Egypt haven't been exposed to the new technology being tested for acceptance (eHealth) but intend to use it/accept it due their perception that it is easy to use. Since the sample selected are already Internet users using it for different purposes, they are likely to understand and perceive the degree of effort required to use eHealth as a new technology. The significant relationship between effort expectancy and behaviour intention found in this study is also supported by (Davis 1989; Davis et al. 1999; Venkatesh et al., 2000, 2003).

Egyptian citizens are unexposed to officially available eHealth technologies for their use, however according to results found from this study, citizens do look out for health information online and therefore both EE and PE have significant impact on their acceptance of eHealth.

Any situations that interfere with or interrupt users perceptions of usefulness such as privacy concerns as an example may affect technology acceptance. Since PE is significantly influenced by EE and privacy concerns i.e. they see it is easy to use however they do have negative attitudes to privacy online, therefore this might lead to low levels of users BI. Awareness of eHealth technologies benefits is needed for PE levels to increase and hence arriving at higher BI-levels. The Egyptian culture is different than other settings where privacy now has been given great concerns and peoples nature are pessimistic rather than optimistic which may lead to low PE of users. The pessimistic moral experiences might be due the political instabilities that they have faced in the past two years.

In order for higher PE levels to be achieved, eHealth technologies need to be advertised and promoted properly when initiated where users are presented with the various benefits that they endure. This is particularly hard to attain if the opposite was true, simply if people perceived the technology difficult to use (low EE) then it would be difficult to actually go on with the eHealth initiative. Interestingly it was found that

performance expectancy and effort expectancy were predictors for eHealth technology. Similarly findings form qualitative results have shown that PE, EE are also important and significant predictors of eHealth technology acceptance (BI).

On the other hand the relationship between EE and PE was also tested in addition to the direct effect found of EE and BI as above. Hypothesis 5 was accepted in this study, which was: higher levels of EE lead to higher levels of PE (P-value > 0.05), which shows that EE is correlated with PE. This has been explained in studies where high effort expectancy contributes to improve performance (PE) (Wu et al., 2011). In this context the easier it is to use eHealth technology the more they would perceive that the technology might be useful in their various aspects of health care management. Probable reasons are those that were discussed, and logically if people would perceive a newly introduced technology to be hard to use, would never experience that it might be useful. This was also suggested by (Davis et al., 1989), where EE is important when subjects have no experience in using a new technology or information system where they will likely use if it is free of effort. In this study this relationship was found to be significant. Furthermore, this relationship was also supported by the explanation that if the technology is not free of effort to users then they might be willing to use other alternatives (Wu et al., 2011). When talking about eHealth this might be accessing health care offline (in person) leading to complete rejection of eHealth technology (no acceptance).

The significant impact found on performance expectancy by effort expectancy as UTAUT hypothesizes is contrary to what (Hu et al., 1999) found. They found that effort expectancy had no significant effect on performance expectancy of the telemedicine technology in Hong Kong. Their claim was that the particular technology and user population in their study were limited to TAM's applicability. In summary and in justification of the influence of EE on BI, (Jeng and Tzeng, 2012) emphasize that effort expectancy is critical in the introduction of a new technology that can be constrained or even fail when factors related to ease of use are not taken into account by technology designers. This relationship further also depends on the user's experience using the Internet and the underlying perceived effortless advantages that could be gained from using such technology. These findings are consistent with those reported from the literature (Davis et al., 1989, Venkatesh et al., 2003; Holden and Karsh, 2010).

Findings regarding the relationship between PE, EE and BI, provide managerial and design implications for eHealth technology developers and service providers where it is important that they should provide easy to use interfaces to encourage Internet users in using eHealth technology and in turn users will perceive the benefits of the use.

These findings were also similar found from qualitative results, which have shown that

PE and EE are major determinants of BI. From the physicians' point of view some researchers suggest that the magnitude of performance expectancy among patients is larger than that generally found for doctors (Beekens, 2011), which might be because the impact of eHealth affects a users' quality of life all day, whereas it is only part of the daily profession and not the private life of a doctor. Findings from this study's qualitative results have revealed that using the new medical systems among doctors helps them in performing their job better regarding medical diagnosis and efficiency in medical care. Hence, this increases their performance expectancy, which in turn also increases their acceptance to use eHealth technologies. The effect of PE and EE from the physicians side supported by (Im et al., 2011) who found that the use of a clinical decision support system (CDSS, a medial decision support system) improves the medical professional's job performance. Kawamoto, et al., (2005) also concluded that the CDSS significantly improved clinical practice and that it significantly improves the medical experts' performance in terms of accuracy and efficiency in diagnosis, which makes doctors have higher intention towards the use of the CDSS.

Studies using UTAUT have shown that EE might have the same influences on BI if not even more than that of PE. A study on nurses' acceptance of technology has represented the same results were EE had a greater effect on BI than PE (Kowiltawakul, 2008). Furthermore, the results of this study is also in line with (Holden and Karsh, 2010) where PE and EE in this study have a significant impact on BI.

Although performance expectancy and effort expectancy are two of the major determinants for behavioural intention in technology acceptance models yet only seven out of 52 computer health information technology patients studies explored their effects (Or and Karsh, 2009). All the studies except two, demonstrated significant effects on acceptance, which exerts a need for studies to examine the effects of PE and EE to be incorporated in models that further explain eHealth acceptance.

The popularity of mobile devices such as laptops, mobile phones, digital diaries and other electronic devices that help in organizing work schedules has led to the increase in the number of Internet users worldwide (Wu et al., 2011). Electronic devices are extensively used by many people to access the Internet for various purposes. One of the main constructs of the UTAUT model is facilitating conditions (FC) that have been tested in organizational settings. In the eHealth acceptance domain FC was not tested in previous research studying user's/patients' behaviour. Due to its assumed importance in this research and due to the wide applicability of UTAUT in many settings it cannot be seen why not to do so. Accordingly Hypothesis 3 which was: facilitating conditions might affect user's BI (acceptance of eHealth services), was accepted in this study meaning a significant relationship was found between FC and acceptance.

This research has adapted FC to the end user (patients side). Simply meaning facilitating conditions is the availability of resources and skills for the end user, which might affect his or her BI. These resources are the availability of Internet access, computers/laptops and other devices that might help in the use of eHealth such as printers and scanners. The skills are those needed to work around electronic devices such as computers, scanners, printers etc.

In order for Internet users to accept eHealth, there is need for them to have considerable experience in using electronic devices that would help them print appointment slips, scan an X-ray, and browse the Internet. The significant relationship found between facilitating conditions and eHealth acceptance in this study (confirmation of hypothesis 3) is in line with (Or and Karsh, 2009), who suggest that just as the introduction of a new technology in an organization will lead to changes in some work tasks, the same applies when introducing eHealth, which changes the way patients might manage their health care. For example, devices used in managing healthcare change to its electronic version such as digital diaries, printers and scanners instead of using paper based ones. Such change might therefore influence perceptions and attitudes towards eHealth technology acceptance generally.

A survey result from Pew Research Center reported in (Wu et al., 2011), suggested that 56% of all Americans have used a variety of devices such as laptops, cell phones, game consoles and others to access the Internet. In addition the penetration rate of wireless access in Egypt is 29,809,724 Internet users for June 30, 2012, and penetration rate is 35.6% of the population (Internet world statistics, 2012), this has increased since 2009 where Internet users where around 16,636,000 and penetration rate was 21.1% (ibid). In this study, a significant effect was found between FC and BI meaning that if resources and skills are available to users then they are likely to accept eHealth. However, research in examining the effect of facilitating conditions from a patient perspective in the eHealth domain has not yet been done. In this research, examining such relationship was a challenge and satisfies the recommendations from studies that have emphasized the importance of testing facilitating conditions influence on acceptance. In summary, the significant relationship found between FC and BI suggest that regardless of how useful and easy to use a technology (eHealth), it is important that technical barriers are removed and availability of resources exists to enable and facilitate the use of eHealth by users which is supported by (Holden and Karsh, 2010; Venkatesh et al., 2003; Wu et al., 2011; Or and Karsh, 2009).

Social factors have played major role in technology acceptance studies outside of the health care context. However, although social influence is one of the major variables in the UTAUT model, no studies have yet examined its effect (Or an Karsh, 2009), it was explored in other health care delivery contexts, which have found that SI predicts

acceptance (BI). For example (Yi et al., 2006) have found a significant effect of SI and BI when conducting a study on physician's acceptance of a PDA that was used to support clinical practice. Social influence in their study was mainly exerted from colleagues who have used the PDA and therefore have recommended it for others to use. In this study social influence is exerted from the physicians side who might recommend the use eHealth technology to their patients (users).

In this study there was no significant effect found from SI on BI leading to the rejection of hypothesis 4a and 4b. The effect described above might be due to the limited influence that physicians might have on their patients as perceived by users. Another reason is that the medical care itself might not be satisfactory and therefore dissatisfaction with medical care exerts an effect on social influence, which in turn affects BI. This is in line with (Wilson and Lankton, 2012), who suggested reasons for significance of relationship between satisfaction and behavioural intention, which are mainly that patients satisfied with medical care are most likely to accept eHealth offerings, form their physicians. In this study, the social influence and satisfaction in medical care have no effect on acceptance. Moreover, users might perceive that it is solely their decision and therefore would not follow others advice. However, results form other studies are not always consistent in reporting the relationship between social influence and behavioural intention or acceptance of eHealth (Or and Karsh, 2009). Also some studies didn't investigate the relationship but emphasized that it is important to do so, where patients are likely to accept eHealth depending on the urge exerted from their physician, home care nurse, children or grandchildren (ibid). In this study social influence was tested only from the doctors side on users. Unfortunately, the effect of social influence on behavioral intention could not be determined in the present sample, however it cannot be concluded that SI does not exist in non-physicians settings.

The insignificant relationship found between SI and BI in this study is also supported by (Jeng and Tzeng, 2012) who found insignificant relationships of social influence towards the intention of using the clinical DSS (CDSS). Reasons for insignificance in their study were that medical doctors are trained and skillful professionals who are less likely to be influenced by social norms in their professional field.

The insignificantly found impact of social influence on acceptance in this study is also supported by (Roberts and Henderson, 2000) finding that social influence did not have an impact on attitude towards using an information system for government employees, which addressed a similar exception of a SI in UTAUT and TAM2. Original founders of the technology acceptance model, Davis et al. (1989) mentioned that, ‘‘more sophisticated methods for assessing the specific types of social influence processes at work in a computer acceptance context are clearly needed," (Jen and Tzeng, 2012).

This study adopted social influence construct form explanation in the literature where social influence may be exerted from doctors themselves towards their patients. There are social influences such as children and grandchildren that might be further explored.

Regarding privacy attitudes and concerns, an inverse significant relationship was found with behavioral intention, which leads to a confirmation of hypothesis 6a: attitudes to online privacy may affect the acceptance of eHealth services (BI).

As discussed previously, people might use a technology even if they do not have a positive attitude to use it because it may enhance their productivity or simply might be free of effort (Wu et al., 2011). People might accept eHealth technology due to their perceptions towards its usefulness and ease of use even if they have privacy concerns however these might become a barrier to eHealth acceptance if not addressed in the development of eHealth services.

In this study a significant relationship (inverse) was found between privacy concerns and attitudes and acceptance. The growing concerns of how much individuals are able to protect their personal information about oneself is attracting greater attention in the literature especially in ecommerce (Liao et al., 2011). The inverse relationship found in this thesis is supported by studies in other IT contexts (Liu et al., 2005; Ackerman et al., 1999; Jensen e al., 2005).

As a society, if there is a will to use the Internet as a force for positive changes in health care, there is a need is a need to remedy one of the most powerful barriers for eHealth acceptance and participation which is users' fears that their privacy might be violated and their health information could be used to hurt them (Goldman and Hudson, 2000).

Also, in confirmation of hypothesis 6c: Privacy concerns might negatively affect PE, it was found in this study that privacy concerns are inversely related to performance expectancy. This finding may transform privacy concerns to be a barrier of acceptance. Thus, people's privacy concerns shapes in their attitudes to online privacy that might degrade the usefulness of using eHealth (lower performance expectancy), which in turn negatively affects eHealth acceptance (BI) supported by (Paine et al., 2007, Ackerman et al., 1999; Westin, 1991; Jensen, 2005).

Other studies such as (Harris et al., 1998) reported that 87% of Internet users are 'concerned' about threats to online privacy; a PC world survey (2003) of 1500 Internet users found that 88% were concerned about websites sharing their e-mail address, and 91% were concerned about being tracked while using the web; Statistics Canada (2006) reported that 57% were worried towards using credit cards online, (Westin, 1998) found that 81% of Internet users are concerned about their privacy when online and also (Ackerman et al., 1999) found that 87% are concerned about threats to online privacy

when transacting online.

Privacy concerns affect the acceptance of eHealth technology negatively just as it affects ecommerce transactions, which was found as valid in this study especially when disclosing personal information. It was found that attitudes to online privacy of respondents have a significant inverse impact on behavioural intention to use eHealth. This was supported by (Cranor et al., 1999; Johnson, 2008; Ackerman et al., 1999) who found that the most important factor influencing users decision to disclose personal information is whether such information is going to be shared with other entities. This is because usually in ecommerce transactions it is difficult if not impossible to complete a transaction without revealing some personal information such as billing or shipping address therefore users may be unwilling to provide such information or even browse online if they believe that their privacy is threatened (Ackerman et al., 1999).

In addition to the above reasons to explain the significant inverse relationship between privacy and behavioural intention there are more available. Some of these reasons could be that people are aware that direct marketers collect personal information without permission and they don't know how it will be used. In addition newsbreaks that come out every now about companies, banks and insurance companies who either purposely or accidently reveal their customers personal/financial/health information. An example of these stories is a company selling health products accidentally reveled names, phone number and financial details of its customers on its web site in addition to many other stories that are heard by the public, which heightens privacy concerns. (Ackerman et al., 1999) regarding this issue states that people are concerned about their privacy particularly on the Internet due to nearly every day's news reporting a potential privacy violation on the Internet.

Without strong privacy rules, the benefits of eHealth in bringing along quality health care and support may become just another failure and hinder expenses on such technologies (Goldman and Hudson, 2000). In addition, users need to trust that their most sensitive information will be safeguarded otherwise patients will avoid seeking care whether online or offline (ibid). The negative correlation found between privacy and acceptance in this study is also supported by findings from a survey reported by (Goldman and Hudson, 2000) that suggested a significant percentage will not engage in certain health related activities online because of their privacy and security concerns, 40% will not give a doctor online access to their medical records, 25% will not buy or refill prescriptions, and 16% will not register at websites and 17% do not go online to seek health information because of their security and privacy concerns.

Users concerns and fears may be eased by strong privacy policy. 80% of the survey respondents reported previously, said that the availability of a privacy policy that

enables them to make choices on whether and how their health information could be shared would increase their willingness to engage in eHealth. These findings have implications for eHealth technology designers and developers. Addressing and accounting for such policies especially that eHealth acceptance was found to be significantly and positively influenced by PE, EE and FC in this study and negatively influenced by online privacy concerns and attitudes.

In addition information technology development has raised important questions about privacy of highly personal medical information collected online where such advances has facilitated the ease of collecting and exchanging of such information usually regarded as very sensitive (Rohm and Milne, 2004). Results in this thesis has shown that when respondents were asked if they think their medical information should be private, 69% said “yes”, 15.3% said “no” and 11.5% said “not sure”. This is supported by (Phelps at al., 2000) has emphasized that the degree of consumers perceived risk is based upon the type and sensitivity of information requested, in this case medical information.

Respondents of this thesis survey were asked to justify reasons for their answers of why they think their medical information should be private, approximately 25.6% said it was confidential (n=104), 5.2% (n=21) said that they should be asked permission first before it is shared, and 10.4% (n=42) said that its was sensitive and affects one’s dignity, and people may act weird and sympathetic and finally 1.7% said that it might be misused or sold to third parties which might directly influence insurance policies and loans as per example and on the other hand 15% (n=63) said it is ok to share information for the sake of exchange of medical experiences and symptoms sharing which might help others and it might good to get prescriptions from doctors online but preferably without personally identifiable information, 2.5% agree to share medical information simply because it is not a secret, one percent (n=4) indicated that it was ok to be accessed by family for emergency cases and help in critical situations, two percent (n=8) said that they expect information to be private online just as it is offline from doctors side and finally one percent (n=4) said that it is not a problem for advanced Internet users.

In aggregation of these numbers it can be seen that reasons for privacy of medical information are cumulatively 43% who appeared to say that health information should be private with the difference in reasons stated above and 21% appeared to say that their health information might not be private also with varying reasons stated above. Furthermore, results regarding the degree that privacy concerns may prevent them from buying services online has shown a total of approximately 50% indicating that it is most of the time or always a concern whereas about 35% indicating it was sometimes or once in a while a concern and on the other hand 11.2% indicated that it was never a concern.

In summary the results from this study are also supported by many others reporting that people are concerned about their online privacy and it being an important factor in their online decision-making (Cranor et al., 1999; Culnan et al., 1999, Rohm an Milne, 2004; Jensen et al., 2005; Liao et al., 2011) and also reported it as a reason for not engaging in online and ecommerce transactions (Jupiter, 2002; Jensen 2005, Liao et al., 2011). Previous studies have indicated that some people take actions to protect their privacy due to such concerns (Jensen et al., 2005; Paine et al., 2007), results from this study are consistent with such which has surprisingly shown that relatively half of the sample tried to install software to help them protect their privacy online (57.8%).

Some respondents do say that they are concerned about their privacy but they still show greater responses to transacting online, supported and also a point noted by (Jensen et al., 2005).

In this thesis although about half of respondents are worried about their privacy online in general, yet 36% frequently use the internet for personal finance and banking, 77% for communications, 30% for buying products/services online, 63% for browsing for health information and 40% for using online health related activities such as online prescription and online appointment booking. In addition 81% have used the Internet to search for a health condition and 56% used Internet health advice through hospitals or Internet pharmacies.

Reasons behind such patterns could be due to the perceived usefulness of the Internet in general towards these activates as discussed previously that people might have privacy concerns but still use the Internet due to its usefulness and trust in online transactions also supported by (Jensen et al., 2005) and defined as knowledge challenge. Another reason is that according to Internet exposure and experience of the sample, which have shown a positive effect on BI, therefore such experience gauges users in these activities regardless of their privacy concerns.

The public's concern towards lack of privacy when online has been noted and justified by many. In general much of the discomfort that users feel towards the Internet is simply due to not knowing or not trusting the information practices of a site, therefore in order to increase comfort level, users must be informed and need to trust the policies disclosed. Successful adoption and implementation of new services requires high user acceptance, which can be achieved by addressing users' special needs and requirements. Despite the high practical value for healthcare technology, eHealth products and technology introduction need to take cautionary notes from a human perspective (Wiktoria and Ziefle, 2012).

Therefore finding an inverse relationship between privacy and acceptance in this thesis places importance in addressing privacy issues at large when developing eHealth

systems to achieve wider acceptance and use of eHealth services. Accounting for privacy is especially important because if concerns outweigh the perceived benefits, the acceptance of eHealth might falter and the consequences could destroy an efficient development and success of eHealth technologies. The dilemma between privacy loss and benefit through eHealth was found to be a gap in the literature placing a need to explore how users perceive online privacy and in the context of eHealth technology acceptance This gap has been filled by this study where general online privacy attitudes and online trust factors were embedded with technology acceptance factors forming a model particularly for eHealth acceptance.

Online trust is also a factor that affects acceptance. Furthermore, trusting online transactions through sites that are expected to act in a good manner is one of the factors that might affect acceptance of new technologies. This relationship was tested in this study, hypothesis 7a which was: there is a positive relationship between the level or degree of trust an individual with online transactions and the individual's behavioural intentions. Hypothesis 7a was accepted showing a significamt positive relationship between online trust and acceptance of eHealth.

The positive relationship found between trust and behavioural intention in this study implies that users who trust online activity may have greater acceptance of using eHealth technology. This is supported by (Rohm and Milne, 2004) who suggests that trust is an essential factor in online settings, which is also essentially important in health care. Many studies have reported that trust and privacy are two of the most important factors affecting the decision to disclose personal information on the Internet (Liao et al., 2011; Hoffman et al., 1999; Gefen et al., 2003). In addition trust (Corbitt et al., 2003; Sillence et al., 2007; Ackerman et al., 1999; Liao et al., 2011) and privacy concerns (Liu et al., 2005; Ackerman et al., 1999; Malhorta et al., 2004) are frequently emphasized in literature as the main reasons for individuals' lack of interest in online transactions. This might therefore affect acceptance.

Interestingly another significant interaction was found between online trust and performance expectancy when explored. Hypothesis 7b was accepted which was: Higher levels of trust may affect performance expectancy positively showing a direct correlation between trust and performance expectancy. Trust as the independent construct significantly influences performance expectancy as the dependant construct. This is consistent with (Egger, 2003) who emphasized that besides trust factors are the interface properties and the *usability* of the website regarded as important factors in e-commerce sites. The significant relationship found between both therefore means that trust has been found to increase performance expectancy of eHealth. This implies that the increase in online trust by Internet users therefore increases their perceived usefulness of the technology. Hypothesis 7b was therefore accepted (P-value > 0.05)

where higher levels of trust affect performance expectancy positively. This was supported by (Gefen, 2004), who stated that in non-commercial related contexts, trust is also expected to increase the perceived usefulness of an information system and affects behavioural intention. The connections between trust and TAM have been widely discussed in the previous literatures. This study follows the hypotheses proposed by most of the other TAM related studies that trust is an antecedent of performance expectancy and a descendant of Internet experience. Finally it was found that trust has a direct influence on behavioural intention, which was supported by many in different contexts (Wu et al., 2011). The impact of trust on TAM is hypothesized and tested in many articles but trust has not been tested on the UTAUT. Difference in contexts that examine influences of trust still remains unclear (ibid). In essence, users simply do not trust most web providers enough to engage in "relationship exchanges" involving their money and personal information (Hoffman and Novak, 1999).

Many ecommerce studies have also focused on monetary transactions. However a few have examined the impact of privacy concerns and trust on other activities beyond monetary transactions and even fewer studies surprisingly focused on their role in information searching especially that requiring personal information disclosure (Liao et al., 2011) and none has examined the effects of online privacy and trust on eHealth technology acceptance from the patient's side. (Liao et al., 2011) emphasized that little is known regarding the relationships between trust, privacy concerns and perceived risk and their effects on the intention to transact and retrieved privileged information. Thus they have designed an integrated model to examine these two activities including Internet literacy and social awareness besides privacy and trust. Their findings therefore support those found from this study.

The significant relationship found between trust and behavioural intention in this study implies that people who trust online settings have tendencies to believe in the perceived usefulness of eHealth technology, which in turn affects the acceptance of eHealth. With this level of trust, it is assumed that eHealth web sites have potential for developing long-term relationships with users. Nowadays in a society that is rich with information, users are likely to use medical web sites to understand symptoms and diseases. Thus creating the potential "self-diagnosis" of their medical condition as well as participating in managing their health care efficiently. In summary trust is important in many transactional relationships, especially those containing risk such as online transactions (Liao et al., 2011).

Internet privacy concerns and trust when combined may therefore have an effect on individual's intention to purchase online where variables like privacy concerns, and trust are also found to be drivers for eHealth acceptance as was found in prior e-commerce studies. Studies within a health context found that perceptions of credibility research

suggests these perceptions in relation to commercialism ought to be more flexible and more dependent on topic and content. Also supported by (Sillence et al., 2007) who conducted a survey on trust issues found that 209 people said that they had not used the Internet for health advice, which was due to a lack of need rather than a lack of trust in online advice. Eighty four percent of the respondents who had not used the Internet for health advice said that they would consider using it in the future and survey results in 2005 indicated that people still trust the advice offered by the sites and are prepared to act upon it.

As discussed above regarding the importance of Internet access as a facilitating condition that affects acceptance, by the same notion Internet experience and exposure have also been emphasized by many researchers for its importance in eHealth acceptance (Hardikera and Granta, 2010; Wilson and Lankton, 2012; Corbitt et al., 2003). Thus hypothesis 8a was accepted which was : Internet experience and exposure (ID) might have a positive effect on BI. This particularly means that users with previous Internet experience are more likely to accept the use of eHealth. This is also supported by the penetration rates of Internet use stated earlier. In this study Internet experience and exposure (ID) was found to have a positive effect on behavioural intention (eHealth acceptance). The significant relationship between ID and BI is also supported by (Wilson and Lankton, 2012). There are many reasons for such a relationship to be positive. First results from this study has shown that about 78.3% replied yes when answering the question about whether they have ever used the Internet to search for information about a health condition*,* about 50% of respondents often use Internet to browse for health information and about 44% often use the Internet for health related activities (such as Google health). This indication explains the importance of Internet experience, not only in general Internet use but also in health related aspects, on acceptance because more than half of the target sample who are Internet users have been exposed to Internet health issues. These results are consistent with (Bodkin and Miaoulis, 2007) who found that 74 percent of their research sample had searched for health care information in the past six months.

Furthermore, the Egyptian population with the increasing Internet penetration rates that has reached about 36% of the population, often use the Internet for information, communication, involving health care, government, banking and other issues which explains the significant relationship that was found. Furthermore, they are dependent on the Internet for information, communication, job tasks, e-government, e-banking and other ecommerce transactions. It is expected that high levels of ID will increase users' tendencies to accept ehealth that is supported by (Corbitt, et al., 2003; Wilson and Lankton, 2012; Wilson and Lankton 2007) who emphasized that increased web experience leads to increase in shopping online and accept eHealth. Also consistent

with (Wilson and Lankton, 2007) who defined Internet experience as the degree to which individuals have used the Internet to perform activities such as research, browsing, entertainment, education, communication, and business related activities. The Internet experience and exposure construct is important to the proposed research model because innovations are more likely to be adopted where the innovation is compatible with a previously accepted concepts (ibid) such as using the Internet previously for other purposes. Accordingly it was hypothesized that there is a relationship between behavioural intention to use eHealth technology and prior experience with the Internet. Thus hypothesis 8a was accepted. This is Consistent with Wilson and Lankton, (2004) where Internet experience positively influences beliefs about online information seeking and retrieval, on-line stock trading.

Further interaction effects between privacy and Internet experience were explored and hypothesized. Hypothesis 8b was: Internet experience and exposure (ID) might have a positive effect on online privacy, which as accepted. Meaning that the more experience on the web the more the privacy concerns online This explains the relationship between ID and privacy attitudes and concerns in confirmation of hypothesis 8b where privacy concerns (PC) was used as the dependent construct and Internet experience and exposure (ID) as the independent construct in the model. It has been seen from research that the increased Internet experience means that users actually know what is going on, they understand the importance of privacy issues and might therefore be more cautious since they are aware of violations that might occur on the Internet, which is also supported by (Corbitt et al., 2003). Therefore adding to this, experienced Internet users might therefore have increased privacy concerns i.e. negative attitudes to online privacy.

Interaction effects were also examined between online trust and Internet experience and exposure as was done with privacy concerns previously where hypothesis 8b was confirmed. Also hypothesis 8c was confirmed where a significant direct correlation was found between the trust and behaviour intention. Specifically when using trust as the dependent construct and Internet experience (ID) as the independent construct in the model, the hypothesis was not rejected and there was a direct correlation between ID and Trust. Supported by (Liao et al., 2011) this explains the relationship between ID and BI from another interesting angle as well, where users with greater experience have higher trust online but with greater privacy concerns. This shows explicitly that privacy is a main barrier that affects eHealth acceptance. However, (Liao et al., 2011) also reported that the effect of trust building factors on the intention to engage in ecommerce activities differs between potential and repeat customers, explaining the relationship between privacy, trust and acceptance in the ecommerce context. Health care providers can see clearly from the results of this study that Internet experience; trust and privacy have positive effects with acceptance of eHealth. However, this finding of a positive

relationship between privacy concerns and Internet experience is contrary to the finding reported in (Liao et al., 2011). The study reported in the latter suggested that as consumers gain more experience in online shopping, the effect of general privacy concerns will diminish with increased confidence in transacting. In this study the acceptance is not towards online shopping but towards eHealth where privacy concerns elevate due to the type of data involved (health data) characterized as sensitive and confidential. This also suggests that findings regarding relationships between privacy concerns and acceptance actually depend on the context and the type of data exchanged and if the user is experienced in the context studied. Thus providers, developers and designers must address and account for privacy concerns when implementing eHealth.

The effect of Internet experience and exposure was explored and hypothesized to have an effect on effort expectancy (hypothesis 8d), which was also confirmed. In this test effort expectancy (EE) was used as the dependent construct and Internet experience and exposure (ID) was used as the independent construct in the model, the results displayed good fit to data meaning that there is a direct correlation between ID and EE thus ID has a positive effect on EE.

This study attempts to look beyond the fact that people are concerned. Its purpose is to understand how such concerns affect the acceptance of eHealth in accordance with other technology acceptance factors. These factors include those from the UTAUT and added variables that were addressed in this study such as trust, Internet experience and exposure, as well as satisfaction with medical care. Findings are expected to enhance and inform both Internet policy developers and eHealth technology designers in the development of tools that account for these factors and concerns. Generalizations of findings could be possible in middle eastern countries who share the same culture and mother tongue, yet caution is needed with respect to Internet penetration rates in these countries where Egypt is relatively more advanced in this area with higher penetration rates and greater number in internet service providers. Furthermore these findings could be helpful to privacy activities of the Internet with added implications to efforts done for the eHealth context in particular and to privacy efforts already out there such as W3C, P3P and HIPAA as an example.

7.4 Overall Model Fit

As per above discussion, research findings from the literature regarding whether or not all these factors should be included in testing technology acceptance of eHealth have been mixed and inconclusive. Hence, one of the goals of the current study is to develop a model for user acceptance of eHealth technology examining the relationship among its variables. Accordingly, not only the original model of the UTAUT was tested but also

privacy, trust and Internet experience/exposure factors were added to the model given the nature of health information involved and exchanged being private and of a sensitive nature.

A model is considered appropriate when its GFI and AGFI are greater than 0.9 and its RMR and RMSEA are between 0.05 and 0.08. All GFIs of the model were acceptable: x^2 = 471.575 (df = 28), GFI = 0.96, AGFI = 0.91, RMR = 0.055, CFI = 0.97, RMSEA = 0.073. However, it is very important to note that a more parsimonious theoretical model (model with few and limited number of constructs) often produces better-fit indices (Wu et al., 2012). High fit indices may limit the generalizability of a theoretical model to different contexts or to be applied in different cultures. The overall model fit is shown below in Figure 7.1.

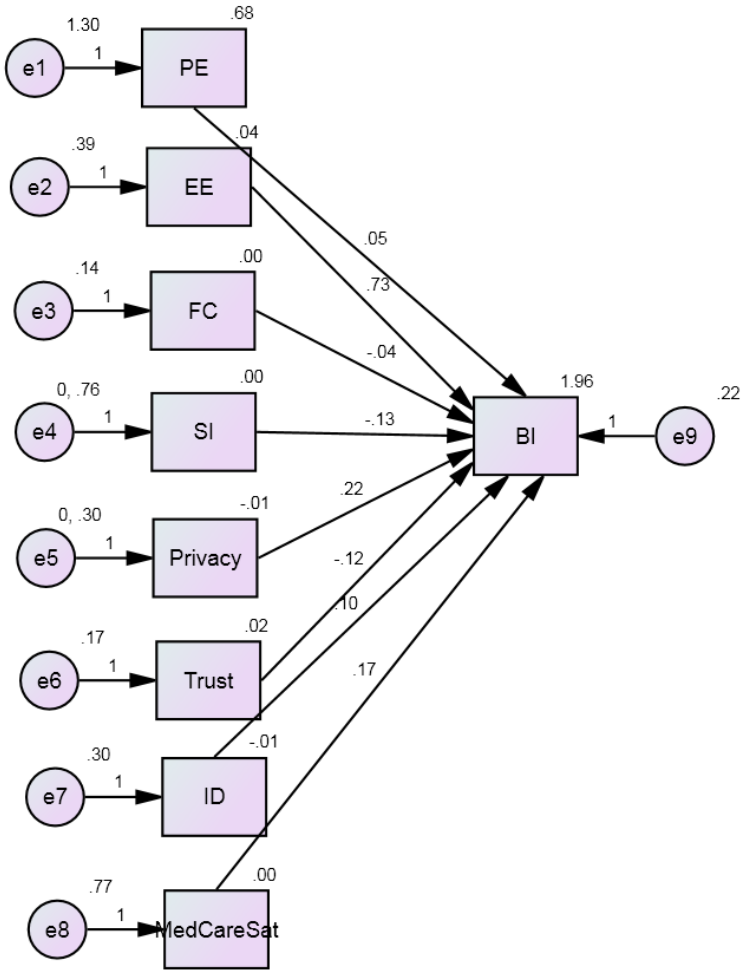


Figure 7.1 Overall proposed research model fit

Given the acceptable model fit of the extended proposed UTAUT model, the path significance and explanatory power were examined accordingly. All the path coefficients of the model were significant as were hypothesized except that of social influence and satisfaction with medical care. In addition, the explanatory power of the proposed model is higher than that was observed in prior studies in the context of eHealth due to it including the added factors that were found to significantly influence acceptance of eHealth.

The original UTAUT has been successfully applied in many other IT contexts. However, when dealing with the health domain, privacy and trust factors need to be introduced and on the other hand since the topic is technology acceptance therefore Internet experience and exposure plays an important role too. Thus, findings in this current study support the notion that a more exploratory causal structure is powerful for predicting and explaining user's intention to accept and eventually use eHealth and still with not a large number of constructs. It is important to develop models as extensions due the fact that it could be cost saving (Wu et al., 2012). Addressing such factors would help designers, developers and eHealth providers in accounting for important factors that saves a lot of money if ignored. Thus, efforts and funds dedicated for such projects could be hindered and become a waste. This is due to not understanding user's perceptions of the technology, which indicates that users' behavioral intention toward using eHealth that can be explained in a more cost effect was which is by adopting a more explanatory version of the UTAUT.

Contemporary research shows that various managerial, economic, and organizational issues are important to run a successful eHealth service (Hofstede, 1984; Hu, et al., 2002; Beekens, 2011; Wilson and Lankton 2004, 2006, 2007; Hardikera and Grant, 2010). However, the behavioural component is seriously underexplored. This is unfortunate when there is a need to focus on the motivations of patients to adopt or reject ICT in managing their health care. In implementing an innovation and maximizing the acceptance by physicians and patients, the first impression of both is critically important. Applications that are poorly adapted to the healthcare setting will have a damaging impact such as wasting resources. This is why research in eHealth should always account for behavioural issues that form an important criterion when studying acceptance models for their usability in health care (Beekens, 2011; Wilson and Lankton 2004, 2006, 2007 Venkatesh & Davis, 2000). Public access to eHealth applications is growing but will not be used unless both patients' and clinicians' expectations and experiences are taken into account during their design and adoption (Flynn et al., 2009).

7.4.1 Context Relevance

UTAUT is an intention-based theory in which people's intention to perform the activity (i.e., accept and adopt a new technology) will resemble their actual behaviour only when the behaviour is under a person's volitional control (Venkatesh et al., 2003) this is similar to TAM and its other versions. Venkatesh et al. (2003) reviewed many user acceptance studies in eight different models and suggested that most of the studies reviewed were conducted in voluntary usage contexts.

Similarly, this research also argues that a very important assumption in UTAUT is that the prospective users' usage of a given information system or technology is volitional and up to themselves. Therefore eHealth is also voluntarily because simply a patient might just rather go to a hospital or pharmacy if he/she chooses not to use eHealth. In addition, since eHealth is a technology evolving nowadays therefore it is important to study its acceptance based on widely used and popular models that have shown success in different domains such as TAM, TAM2 and UTAUT. From here was the choice to use UTAUT due to its promising results recently arrived at in the health domain.

7.5 Comparing Quantitative and Qualitative Data

Comparison between qualitative and quantitative results showed that findings confirmed some of the established research hypotheses however with varying strength. To further confirm the research hypotheses qualitative data obtained from interviews was triangulated with quantitative data for two reasons: First, to clarify the rationale behind the perception of the questionnaire respondents; and second to present the real situation of eHealth acceptance status in Egypt from both sources as well as a plan for an initiative leading to investigate the difference between perceptions and facts and this is following (Osman, 2009; Yin, 2011).

In this study comparing the quantitative results obtained with the research hypotheses showed that findings confirmed all research hypotheses except those related to two constructs, which are social influence and satisfaction with medical care. The table below shows a summary of all constructs effects on behavioral intention as follows in table 7.1.

Table 7.1 – Main significant effects of the constructs on eHealth acceptance

Construct	Effect on BI
Performance expectancy	Moderate effect
Effort expectancy	Moderate effect
Facilitating conditions	Moderate effect
Privacy concerns	Above moderate (high) effect
Online trust	Moderate effect
Internet experience and exposure	Moderate effect
Social influence	Insignificant effect
Satisfaction with medical care	Insignificant effect

Privacy concerns was found to be significant in both methods but with varying strength. It was the only factor that showed a significant high inverse effect in quantitative findings but wasn't given as much effect in qualitative results. This is probably is due to MOHP members not seeing it affecting them. However it was emphasized form interviews that there is a need for policies, laws and regulations to protect patients' health information privacy.

Table 7.2 below shows the effect of the various interrelationships explored among constructs

First Construct	Second construct	Effect of the first construct on the second
Effort Expectancy	Performance Expectancy	EE has moderate effect on PE.
Privacy attitudes and concerns	Performance Expectancy	Privacy has a moderate negative effect on PE.

Online Trust	Performance Expectancy	Online trust has moderate positive effect on PE.
Internet Experience and Exposure (ID)	Online trust	ID has very high positive effect on online Trust.
Internet Experience and Exposure (ID)	Privacy attitudes and concerns	ID has moderate positive effect on Privacy.
Internet Experience and Exposure (ID)	Effort Expectancy	ID has fair (Below moderate) positive effect on EE.

7.6 Summary

Research on adoption and use of eHealth has the potential to guide health care organizations to develop more effective eHealth services and to inform e-service research and practice extending beyond health care. For example, relationships identified between antecedents, expectations, and constructs can provide early predictions that managers can use to assess the likelihood that eHealth services under their supervision will be successful (Wilson and Lankton, 2007). Furthermore, findings form this study are expected to help Health care service providers, eHealth service designers, organizations and various stake holders in the eHealth domain in moving towards the first step for the eHealth initiative in Egypt.

Supporting predictions and hypotheses established, it was found that performance expectancy and effort expectancy indeed positively influence users' behavioural intentions to accept eHealth. These results are in inline with those derived from the UTAUT founders (Venkatesh et al., 2003) as well as from research in eHealth (Wilson and Lankton, 2006; Or and Karsh, 2009 2010, Beekens, 2011; Schaper and Pervan, 2007). However, the effect of effort expectancy on behavioral intention might have greater importance regarding acceptance in the case of newly introduced technologies with less exposed users to such. The reason for this is that if the technology is easy to use then users would be encouraged to use it and perceive its benefits and usefulness.. This is especially important in technologies newly introduced just as in the case in Egypt.

The significant effects of performance and effort expectancy emphasize on the

importance of patients' expectancies on their behavioural intention. Managing these expectations before users start to use eHealth technology, therefore, seems crucial. To ensure that users' expectations are grounded on correct information, and to avoid false or unrealistic expectations, it seems advisable that health care professionals take great care to develop realistic information campaigns, where adequate information is key. This further stresses on that the e-product or e-service based upon eHealth technology should be designed to function perfectly and fit the purpose and the wishes of users (Beekens, 2011). As mentioned before that in order for this to happen there is a need for appropriate training modules during the introduction of such technologies, follow-up sessions to encourage the full potential of eHealth technology and effective advertising and promotion campaigns for general eHealth services. This is also supported by (Holden and Karsh, 2010), who concluded that design, training, and informational sessions must focus on that eHealth is perceived to be capable of improving outcomes and easy to use, which also supports this study's qualitative results from the physicians and governmental officials side. This relationship performance expectancy and behavioral intention found from the quantitative analysis of questionnaire data is also supports the need for the above implications.

The significant relationship between facilitating conditions and eHealth acceptance (behavioural intention) has been justified, that despite the degree of effort expectancy and performance expectancy of user, there exists a need that the availability of resources and skills to the technology users in necessary. Furthermore from the physicians side the same results has been experienced and supported by (Holden and Karsh, 2010) who mentioned that such significant relationship implies that there is a need for steps to be taken to make sure that barriers are removed and sufficient support is provided.

Furthermore the insignificant relationships between social influence and satisfaction with medical care and acceptance has been explained due to the poor level of health care that is experienced in Egypt which therefore showed that such relationship is not present and people might therefore not be influenced by health care providers. However, it is no possible to say that social influence does not have an effect on behavioural intention in other cultures or contexts.

The added construct of Internet experience and exposure was also found to have a significant impact on behavioural intention. This relationship as shown that it is important that potential eHealth users would indeed tend to accept the technology if they had Internet experience and exposure.

The resulting deficiency in healthcare creates a need for novel technology-assisted solutions to meet the rising difficulties in supporting the constantly growing number of

chronically diseased persons, older people, or persons with weak health. People with good health also tend to use eHealth technologies and are also concerned to restore their good health standard. Rapid technological advances present novel opportunities to support both types of health care consumers in maintaining independence and mobility in their life styles (Wiktoria and Ziefle, 2012).

However, despite the potentially high value of these new technological developments for the demands arising from demographic change, the privacy of medical information as well as data handling is an important issue. This is due to considerable consequences for social living and ethical requirements. Therefore this study addressed general privacy attitudes and perceptions when online. The next chapter is a summary of the whole thesis addressing conclusions, contributions and future works.

Chapter 8 – Summary, Contributions, Future Research and Conclusions

This chapter summarises the work described in this thesis, highlighting the research gap and showing how the research contributes to filling this gap addressed by the research question. Recommendations for policy makers, health care providers and eHealth designers are provided, research strengths and limitations and future directions are discussed.

8.1 Thesis summary and answering the research question

The previous chapter discussed the results obtained from both quantitative and qualitative analysis. In summary the research hypotheses were confirmed except two, which were related to the social influence construct. This has proved the viability of the model derived from the literature.

An extensive literature review conducted for this study has shown increasing interest in end-user's reactions to health information technology placing at centre stage the importance of theories that predict and explain eHealth acceptance and use. There is a considerable body of literature testing the acceptability, feasibility, and effectiveness of various consumer health information systems (CHITs). However, despite the fact that eHealth brings improvements in health care management these systems are still not always accepted. The reasons assumed in the literature point to: usability, insufficient training, lack of computer skills, low self-efficacy and privacy. The focus of this study has been on privacy attitudes and concerns. There is a gap in the literature regarding the use of technology acceptance models in eHealth from the user's side on one hand, and the importance of additional factors affecting acceptance on the other hand. Specifically to date there is no research modeling users' eHealth acceptance (using UTAUT) while taking into consideration privacy, trust and Internet experience factors neither in the literature nor in Egypt. This gap has been filled by this thesis, which has employed a widely used and well-known technology acceptance model for IT (UTAUT) to be able to model and understand factors influencing eHealth acceptance.

This research was started to expand the knowledge on Internet users (patients) technology acceptance of, and their behavioural intention towards eHealth technologies in general. In particular, the focus was on privacy and its relationship with technology acceptance factors hence the adoption of UTAUT took place. In addition privacy, trust

and Internet experience and exposure factors were also examined providing an extension of the UTAUT model for eHealth acceptance. When the technology acceptance factors importance was realized in this research, it was necessary to adapt the research question to technology acceptance. Thus, the technology acceptance process in health care was studied in order to answer the following research question:

How do privacy attitudes and other technology acceptance factors affect the acceptance of eHealth in Egypt?

The research question was answered supporting predictions, of the UTUAT (Venkatesh et al., 2003) where it was found that performance expectancy, effort expectancy and facilitating conditions indeed positively influence users' behavioural intention regarding the use of eHealth technology. Unfortunately, the effect of social influence (SI) and its antecedent (satisfaction with medical care) on behavioural intention could not be determined in the present sample, but it cannot be concluded that the SI construct is non-existent in patient settings. A range of reasons for the lack of significance found were discussed in the previous chapter, based on research undertaken by others on social influence. However, much previous research has taken a perspective from the doctors' side not from the patients' perspective. This is supported by, Davis et al. (1989) –original founder of TAM – who mentioned that, ''more sophisticated methods for assessing the specific types of social influence processes at work in a computer acceptance context are clearly needed", (Jeng and Tzeng, 2012).

Due to the specific focus on Internet users (patients side), several additional factors were included in this research.

First, the online privacy concerns and attitudes construct was included to study its influence on patients' behavioural intention (Jensen et al., 2005; Ackerman et al., 1999). Supporting predictions, a significant inverse effect was found from online privacy on behavioural intention (eHealth acceptance), leading to the acceptance of the hypothesis.

Second, the online trust of users was also accounted for. Online trust was found to have a significant positive effect on patient's behavioural intention.

Third, Internet experience and exposure (ID) was also added and a significant positive

effect was found between ID and eHealth acceptance.

Fourth, satisfaction with medical care was tested as an antecedent of social influence. Unfortunately there was no significant relationship found between neither social influence and eHealth acceptance nor that from satisfaction with medical care on social influence.

Finally, further interaction effects among performance expectancy, effort expectancy, Internet experience and exposure, privacy, and online trust were explored. Interestingly, though, the additional exploration has found that there is a significant positive relationship between effort expectancy and performance expectancy, Internet experience and trust, trust and performance expectancy, Internet experience and privacy concerns, Internet experience and effort expectancy and finally, a significant inverse relationship was found between privacy concerns and performance expectancy. This has provided evidence and justification for the importance of the added factors in predicting users' eHealth acceptance due to the interesting significant relationships found between the added constructs and behavioural intention. The main factors that affect the acceptance of eHealth technology in Egypt are therefore: performance expectancy, effort expectancy, facilitating conditions, online privacy concerns and attitudes, online trust and Internet experience and exposure.

8.2 Contributions and Implications

This research contributes to the body of knowledge in eHealth and technology acceptance by focussing on the patients' as users of eHealth technology. Until now, the perspective of the general patient in eHealth technology acceptance has not been modeled as the case with practitioners, doctors and nurses. This research clearly shows that for users, the theoretical assumptions underlying the UTAUT model (Venkatesh et al., 2003) prove insufficient to explain technology acceptance of eHealth technology.

More specifically, to properly understand the users' considerations, there are additional factors playing a key-role, which are privacy concerns, trust and Internet experience. Many researchers have emphasized that technology acceptance models such as TAM and UTAUT are not tailored for eHealth acceptance, and that therefore there is a need to add factors that might affect acceptance within the eHealth domain (Holden and Karsh, 2010). In the research reported in this thesis, the adding of privacy concerns, which are crucial due to the sensitivity and confidentiality of health information by nature, and adding online trust and Internet experience and exposure constructs have

proven to be of importance due to their significant effects found from the study results are a major contribution.

While these significant relationships found from results from this study confirms the importance of addressing these factors in existing literatures on patient experiences in health care regarding privacy concerns (Paine et al., 2007; Jensen et al., 2005, Wu et al., 2011), online trust (Wu et al., 2011) and internet experience and exposure (Wilson and Lankton, 2007), it also extends these literatures by showing that once privacy concerns, trust and Internet experience are entered into the equation, matters are not straightforward, because privacy has shown an inverse effect on acceptance and a positive effect on Internet experience. Whereas trust and Internet experience are positively related, similar to the other UTAUT factors related to behavioural intention. Combining online privacy, online trust and internet experience with the UTAUT original factors has therefore added to the body of literature and has also shed light on the importance of privacy in eHealth acceptance, which was predicted to act as a potential barrier confirmed with the negative correlation found in the results.

The second contribution of this research is the finding of correlations between privacy, trust and Internet experience and the UTAUT underlying constructs such as performance expectancy (PE) and effort expectancy (EE). One of the findings is that there was an inverse realtionship between privacy and performance expectancy meaning that privacy concerns might negatively affect PE (Chapter 6 p. 173). Another correlation was also found between Trust and PE meaning that higher levels of trust may affect PE positively (Chapter 6, p. 174). Finally, Internet experience and exposure had positive effects on behavioural intention, privacy and trust, meaning the greater the Internet experience and exposure the greater the eHealth acceptance, the more the privacy concerns and the higher the online trust respectively (Chapter 6, p. 176). These factors, despite their importance and emphasis in literature, have not yet been tested and associated with acceptance factors from the user's point of view. This research therefore serves as the first step towards modeling Internet users acceptance taking into consideration these factors and their interaction effects with the UTAUT original factors.

The third contribution of this thesis is hypothesizing and including the facilitating conditions construct, which was not accounted for in studies on patient acceptance before. However facilitating conditions was only addressed in studies on eHealth acceptance of physicians. It was decided that including facilitating conditions, as an important UTAUT construct in the research model is interesting and there is no reason why it shouldn't be tested. Interestingly, facilitating conditions was found to have a significant positive influence on eHealth acceptance showing its equal importance in the users' perspective as that from the practitioners' perspective. The availability of

resources and skills is thus important in determining users' acceptance, as it is important in determining acceptance of physicians, doctors or nurses.

Even though this was not entirely in line with studies nor was it addressed before, it is still consistent with the theoretical foundation of the UTAUT (Venkatesh et al., 2003) and shows how important this factor may be for predicting patients' behavioural intentions. Having done so, it is of theoretical relevance for further research on technology acceptance of patients in health care to further establish this specific model, and to seek replication of this effect in additional field studies.

The results of the present research also highlight several practical implications regarding eHealth technology development and use. First of all, the significant effects of performance and effort expectancy stress the importance of users' expectancies on their behavioural intention. Therefore it is crucial to manage these expectations before people even start to use eHealth technology. Specifically, to ensure that users' expectations are grounded on correct information and to avoid false or unrealistic expectations, it seems advisable that health care professionals, eHealth providers and marketers to take great care to develop realistic information and advertising campaigns. Such campaigns need to include all aspects of use taking into consideration usability, ease of use and highlighting the role of privacy protection. Adequate information is key where the introduction of eHealth services needs to be designed to function properly and fit the need and demands of potential users. In addition, predictions involving eHealth acceptance can be made from antecedent characteristics of users, therefore it is important for health care providers to examine these factors before making designs for eHealth design and development also supported by (Wilson and Lankton, 2007).

Secondly, implications for systems developers are towards the attention needed to task-technology fit as well as system user friendliness, which can help in creating systems perceptions of usability and ease of use. Meaning increase performance and effort expectancy respectively. These are especially important due to the importance and influence found on acceptance from both constructs. Such issues are also important if research is extended to targets specifically of older age populations who need systems that are user friendly and fit their daily life styles (Or and Karsh, 2009).

Thirdly, health care providers can use findings from this research in a variety of ways. Several users' characteristics were identified from findings such as their Internet experience and their privacy concerns and attitudes. These findings may be useful in both guiding the overall decision of whether to deploy eHealth and in clarifying hopes for a specific user population. For example users who are experienced in using the Internet tend to accept eHealth technology but on the other hand users with privacy concerns have negative attitudes in using eHealth.

The interaction effects found among the research model constructs in the present thesis also hints to practical implications. The partial models derived highlight the crucial role of users' privacy concerns on performance expectancy and intention to use eHealth technology (acceptance). Simply, health care professionals could begin with reducing high levels of privacy concerns among their patients by explaining the process. By the same notion eHealth designers and developers need to account for such concerns and develop safe design and measures for information privacy. With regard to this, specific information campaigns could target the expectations toward eHealth users where it might be especially promising to develop training modules to familiarize users with the services.

Finally, further implications related to service design is that there is a need for early involvement of potential users who might use this technology to minimize the gap between design and actual user's expectations.

In summary, technology acceptance models that predict and explain users' intention to accept eHealth has not been examined with privacy, trust and Internet experience factors. This current study therefore proposes an eHealth acceptance model including several factors which are: performance expectancy, effort expectancy, facilitating conditions, privacy concerns, online trust and Internet experience and exposure which were predicted to influence eHealth acceptance.

8.3 Strengths

To the best of the researcher's knowledge, this thesis was the first to address eHealth technology acceptance for Internet users in Egypt specifically from the patient's side.

This study was the support from the Ministry of Health and Population (MOHP) officials and their emphasis on the importance of this study as a first step toward the eHealth initiative in Egypt. Also, the MOHP body is interested to build on the results from this thesis for the eHealth initiative. Another advantage is the availability social networks that enabled access to a random sample of Internet users who responded to the questionnaire.

Finally, the socio-economic and education background of the participants was diverse enough in order to ensure a satisfactory spread in the present study.

Results may be generalized across Middle Eastern countries mostly sharing the same mother tongue and similar cultures. In addition, the other side of the coin was also involved in this study where interviews with MOHP officials, doctors and hospital

managers were conducted. Such interviews provided rich insight on the research model factors.

Such mapping was important to be able to understand the feasibility and expectancies of the interviewed parties, which has shown common views regarding the research model constructs. For instance results from both methods have shown common significance of performance expectance, effort expectancy, facilitating conditions, privacy concerns, trust and Internet experience on eHealth acceptance.

Finally, this study contextualized acceptance factors to health settings. The importance of contextualization of technology acceptance models for eHealth has been previously emphasized by Holden and Karsh (2010) who proposed using a beliefs elicitation method for proper construct operationalization. The pilot study undertaken by this study revealed deep insights and understanding of participants' beliefs and perceptions of construct measurements, which informed the further stages of the research and proved to be highly relevant.

8.4 Limitations

The present research also has some limitations. Results are scoped around general Internet users, which may raise the question to what extent valid conclusions can be drawn, and to what extent the results generalize to other cultures and to other groups of patients with specific needs such as those with chronicle illness. Chronically ill patients may for example have different needs especially that they are more likely to be of older age. Users suffering from specific chronic illnesses might likely show willingness to use eHealth that is supposed to increase their wellbeing. Therefore the effort expectancy factor where systems need to be easy to use and free of effort is especially important for chronically ill older age groups.

Since, the research was focusing on Internet users where the questionnaires were distributed randomly, the sample therefore included people with different health status. This raises the issue as to what extent do the effects observed in this study on users' behavioural intentions generalize to specific illnesses.

Third, and related to above, the focus on the elderly as a group with more illnesses due to aging was not achieved. Random selection of participants has shown that the majority of respondents lie in the middle-aged group (20-50 years). Therefore additional studies are needed to target the elderly group where acceptance and services offered might differ in their case.

Another limitation is time where other constructs could have been added such as self-efficacy and quality of care provided however due to time imitation it was not possible. In addition it was preferred to keep the model as simple as possible and to include all the UTAUT factors without excluding any for accurate significance and model fit tests. Results have also indicated that participants are of a relatively high level of education (due to all respondents being Internet users). Although this criterion was essential for the scope of the research yet it might be a limitation where it cannot be assumed that all prevailing aspects of privacy have been covered, examined and mean the same to anyone particularly those who are less educated. Therefore, the extent to which the results can be generalized may be limited and future research could be undertaken to include a wider range of people, such as the less educated, to see if there are any differences in the results, and if so how they may be addressed to encourage these users' adoption of eHealth.

Another possible confusing factor is that this research is (at least partially) restricted to users' (i.e. respondents) imagination of using eHealth, not on their real experience, which could significantly impact acceptance. People might over-emphasize their sensitiveness towards privacy violations. However respondents being Internet users and exposed to Internet technology might have decreased the effect of this limitation.

8.5 Recommendations for Future Research

A first recommendation for future research is to conduct longitudinal research in eHealth technology acceptance. This is because in non-longitudinal research designs, it is not possible to establish that the cause occurred before the effect. On the other hand, in longitudinal designs provided the cause and effect are measured with the appropriate time lag this issue can therefore be overcome (Beekens, 2011). Venkatesh & Davis (2000) and Venkatesh et al. (2003) conducted such a longitudinal research with respect to UTAUT but not in eHealth acceptance. Such studies might prove beneficial to start measuring user's performance expectancy, effort expectancy and privacy concerns for instance before they even start to use eHealth technology. Then their measurements are followed up at later points of time to properly assess the development of their attitudes and possible acceptance of eHealth technology.

Similarly, future research could also be to investigate the social influence of others with regard to potential users. This is to examine the effects of social influence not only from doctors but also from other "important others" such as children, grandchildren, colleagues and other users or patients sharing common illnesses for example. Therefore future works should be directed to testing additional variables (added variable

approach). Specifically (Holden and Karsh, 2010) specified that future works should be directed to use the beliefs elicitation method and studies to identify how technology acceptance variables are contextualized in health care settings and to identify important added variables. This study is the first to apply such approach practically through the pilot study conducted which has helped in the operationalization of the UTAUT constructs based on participants' opinions and understanding. However, more research using this approach is needed to better understand and contextualize technology acceptance specifically in eHealth.

eHealth acceptance research is needed to be directed to specific groups of patients suffering from certain illnesses or chronic diseases. Achieving acceptance of such groups will bring great benefits for managing their health and their overall well-being. Future studies into the role of patient satisfaction in technology acceptance could follow a qualitative approach by interviewing such patients to make implicit knowledge owned by the patient explicit and this can be combined with follow up surveys for more elaboration. This also places the role of focus groups that can endure rich information when conducted with a specific group of users (patients) such as those with chronic illnesses.

The present research showed that users differ in their attitudes towards eHealth technologies which are attributed to varying levels of performance and effort expectancy, or varying levels of privacy, trust and Internet experience and exposure. Hence studies showing the variability in constructs on acceptance are needed. Other constructs may be further added such as quality of care provided, where people's behavioral intention might differ accordingly as a result of personality and individual differences. Therefore it is reasonable to include psychological factors as well to study user's differences and their effect on acceptance.

The present research gained first evidence that a user's online privacy attitudes and concerns can play a role in the user's behavioural intention to accept eHealth technology. Similarly it was found that there is a positive relationship between Internet experience and exposure and behavioural intention. This further highlights the urgent need for public discussions to concentrate more on straightforward and transparent information and communication policy as well as privacy rules and regulations regarding the transfer of health information.

Finally, some people are better capable when dealing with the complexities relating to technology than others. This places a further need and research on cognitive measures. People with high thoughtful demands will generally undertake active efforts to try and structure the situation while increasing its understanding (Beekens, 2011). For future study, it seems reasonable and expected that psychological factors might be

moderators of behavioural intentions of patients.

8.6 Ethical Considerations

It was made clear to the participants in the survey that participation in the survey was voluntary, and the data were collected in an anonymous way and therefore ethical approval was not necessary. Furthermore, a letter of information was attached to the questionnaire at the beginning explaining that all data collected is for research purposes and will be used in aggregate form and that it is not possible to identify respondents in themselves.

8.7 Conclusion

Electronic health (eHealth) is collectively referred to as health related Internet applications delivering a range of content, connectivity and clinical care as a way to bring growth, cost savings, and process improvement to health care (Wilson and Lankton, 2004). Advantages of eHealth are many for both practitioners and users (patients). For example it can enable practitioners to offer services beyond their physical reach where ICT tools and DSS in combination to networks can enable less experienced practitioners to remotely access expertise help to make better decisions with more information, as emphasized in interviews conducted in this thesis. Electronic health makes health information available to health care consumers, and therefore makes health care consumers active participants in the health care delivery process.

The major strength of the research presented in this thesis is that a well-known and tested technology acceptance theory was used (UTAUT). The UTAUT in this thesis is for the first time applied to study eHealth acceptance of users (patients side) while including privacy, trust and Internet experience and exposure factors that were emphasized on from the literatures whether in technology acceptance theories or in the eHealth context. It was shown that users' performance and effort expectancies have a strong impact on their behavioural intention to accept eHealth technology. It was also shown that a user's privacy concerns were inversely related to acceptance of eHealth highlighting the sensitivity and confidentiality of health information. Despite the fact of the inverse relations yet nearly half of the participants (sample) searched the Internet for health advice and participated in online health services before.

Furthermore it was noted from results that Internet experience and exposure have a

positive impact as well on behavioural intention shedding the light on the importance of users being of some Internet experience. This is because Internet experience and exposure also influences performance expectancy implying that Internet experience might mediate the effect between performance expectancy and behavioural intentions.

The literature shows that any discussion of privacy across nations and cultures must be sensitive to the impact of cultural norms and environments before applying universal concepts of privacy (WHO, 2012). Privacy has elevated in Egypt nowadays due to social, economic and political changes experienced through the past years. People in Egypt are more concerned about their privacy now than before. One reason for this from the researcher's point of view, is due to the sense of insecurity that the whole world is heading through not just in Egypt. Another reason is the great advancements in technology when using mobile devices and laptops as well as using the Internet for various purposes such as social connections web sites. Long ago people had their privacy in their hands that is saying what they want, when the want. There were no spy programs, cameras, devices and network connections stressing on the fact that any information can be disseminated and transferred in seconds.

Findings from this research provide implications to law federations that need to impose clear policies governing the exchange of medical information. It may be country's culture in which the legislation has been adopted means that not all enactments of privacy legislation can be seen as equal. For example in Japan, interpreting the existence of the Japanese Act for Protection of Personal Data (2005) as a clear indication that Japan has a western style approach to privacy is not appropriate as stated by (Orito and Murata, 2005). They stated that the Act is rather a reflection of the external pressures exerted by the international community and not reflecting the actual Japanese culture. Therefore findings form this study cannot be generalized to different cultures where behavioural intentions might differ then.

However comparisons can be made across Middle-Eastern countries sharing the same mother tongue and cultural beliefs and on the other hand, policy makers need to account for such differences in culture too. Furthermore, (Collste, 2000) argues that the concept of privacy is based on three universal intrinsic values: autonomy, freedom, and personal relationships where a respect for these values is in itself a respect for privacy. However, societies and cultures might differ in the degree of privacy needed to achieve some of these values; therefore he argues that such differences do not reflect deep cultural differences in the concept of privacy itself.

The principle underlying eHealth is that it is an important tool in establishing safe, efficient, and sustainable health care delivery around the world. Thus the WHO seeks to encourage the uptake of eHealth as appropriate to a nation's needs and capacities.

Challenges for encouraging patient privacy in developing nations may exist because of financial constraints, which make it hard to use more sophisticated health information security tools or to invest significantly in training health-care professionals on how to support ethical principles of privacy. Many WHO regions, in particular the European, American, Australian and Eastern Mediterranean, invested heavily in eHealth solutions to meet the challenges of ageing populations by stressing that a more patient-centered care delivered outside the traditional hospital or general practitioner (GP) office environment will have to occur (WHO, 11, 12). However, in order for eHealth tools to be truly integrated into daily health and care services, many political and policy changes will have to be made.

The inclusion of online privacy and online trust constructs is of critical importance when studying technology acceptance in health care settings. It was shown that they have an impact on a user's behavioural intentions, and also interacts with user's performance expectancy. In summary this thesis provides a fertile ground for the first seed of the Egyptian eHealth initiative to be planted. Nevertheless, exploration of similar and related avenues in future works shaping determinants of user's behavioural intention is needed.

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Appendix A - Questionnaire

Online Uptake of eHealth Questionnaire

1. Letter of Information

Dear Respondent,

Thank you for taking the time to answer this questionnaire. In our society, Internet technology has been merged with many transactions and functions of our daily life. It allows for paying bills online, banking and stock trading, online purchases, online sales, and even health care services. These services when accessed may require disclosure of some of your personal information. I am interested to understand any privacy concerns related to Information Technology and the impact that they may have on your willingness to use online/Internet health services in particular. Therefore, I invite you to participate in the present study by filling out this questionnaire.

This questionnaire is intended to test and measure people's perceptions of Internet privacy, and the effect of such perceptions on the uptake of health services using the Internet which is known as eHealth. The data collected by this questionnaire will be used for research purposes only; it will be treated confidentially and will not be used or distributed elsewhere. Furthermore, only group results will be used for research purposes; individual information cannot be identified. Participating in this questionnaire will help me complete the fulfillment of my PhD.

You will be asked to answer some questions regarding your buying behaviour over the Internet, your perceptions of privacy issues and your demographics. It will take approximately 10 -15 minutes to complete. Your participation in this study is completely voluntary. I would appreciate your help and the time you dedicate to answer it.

Please do not hesitate to contact me for any questions or further explanation through an email to myself at:

n.magdi@mdx.ac.uk

Many thanks for your help.

Sincerely,

Nermeen Magdi Mekawie
Ph.D. Candidate
School of Engineering and Information Sciences,
Middlesex University, London.

Director of Studies
Dr. Mark Springett
Supervisor
Dr. Penny Duquenoy

Online Uptake of eHealth Questionnaire

2. Use of Modern Electronic Equipment at Home/Work

***1. Please choose the ease of use regarding the following electronic equipments if they are in your possession (at home or work). If you do not possess one or more of the following equipments, then please choose the 'N/A' column indicating that it is 'NOT AVAILABLE'.**

	Very Simple	Fairly Simple	Somewhat Simple	Neutral	Somewhat Difficult	Rather Difficult	Very Difficult	N/A
Mobile Phone	◯	◯	◯	◯	◯	◯	◯	◯
Digital Pocket Diary	◯	◯	◯	◯	◯	◯	◯	◯
Digital Camera	◯	◯	◯	◯	◯	◯	◯	◯
Digital Alarm	◯	◯	◯	◯	◯	◯	◯	◯
DVD Player	◯	◯	◯	◯	◯	◯	◯	◯
Microwave	◯	◯	◯	◯	◯	◯	◯	◯
Personal Computer	◯	◯	◯	◯	◯	◯	◯	◯
Laptop/Notebook	◯	◯	◯	◯	◯	◯	◯	◯
Printer	◯	◯	◯	◯	◯	◯	◯	◯
Scanner	◯	◯	◯	◯	◯	◯	◯	◯

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Online Uptake of eHealth Questionnaire

3. Personal Internet Usage Characteristics

Please answer the following questions by clicking on the check box where appropriate.

***2. Where do you access the Internet from? (You may choose more than one answer).**

☐ Home ☐ Work ☐ Internt Cafe ☐ Public Places ☐ None

***3. How long do you use the Internet on average per day? (Hours eg. 3 or 3.5):**

***4. How often do you use the Internet for the following purposes? (Please click the appropriate check box that best describes your frequency of use for the following purposes).**

	Extremely often	Very often	Quite often	Not very often	Not at all
Entertainment (games, music downloads, movies).	◯	◯	◯	◯	◯
Education.	◯	◯	◯	◯	◯
Work-related research.	◯	◯	◯	◯	◯
Personal finance (banking, stock trading).	◯	◯	◯	◯	◯
Current events (news, sports, weather).	◯	◯	◯	◯	◯
Travel-related search (travel tickets, hotel reservations, trip reservations).	◯	◯	◯	◯	◯
Product information gathering.	◯	◯	◯	◯	◯
Communicating with others (e.g. chat/email/video chat/facebook etc.).	◯	◯	◯	◯	◯
Buy products online.	◯	◯	◯	◯	◯
Buy services online.	◯	◯	◯	◯	◯
Browsing for health information.	◯	◯	◯	◯	◯
Using Health-related activities (e.g. online health advice, online prescriptions or online appointment booking).	◯	◯	◯	◯	◯
Other	◯	◯	◯	◯	◯

Please specify here:

***5. Have you ever used the Internet to search for information about a health condition or illness for yourself or another person?**

◯ Yes
◯ No

***6. Have you ever used health websites that provide health advice through hospitals, or Internet Pharmacies?**

◯ Yes
◯ No

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Online Uptake of eHealth Questionnaire

***7. Have you ever heard of the term Electronic Health (eHealth/Internet Health)?**

- ◯ Yes
- ◯ No

***8. Which of these phrases do you think best describes "Electronic Health" to you? (You may choose more than one answer).**

- ☐ Health records on a doctor's computer.
- ☐ Asking for health advice and using pharmacies over the internet.
- ☐ Asking for health advice using health organizations over the internet.
- ☐ Computerized health records in hospitals.
- ☐ Electronic health devices used in clinics or hospitals.
- ☐ Devices in the home to help you with your health.
- ☐ Applications (Apps) downloaded to your mobile phone.

***9. Talking about health information, do you think your health information should be private?**

- ◯ Yes
- ◯ No
- ◯ Not Sure

Please say why you think this?

***10. How often do privacy concerns prevent you from buying services online?**

- ◯ Always
- ◯ Most of the time
- ◯ About half the time
- ◯ Once in a while
- ◯ Never

***11. Have you tried to install any software on your Pc or Laptop to protect your online privacy?**

- ◯ Yes
- ◯ No

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Online Uptake of eHealth Questionnaire

***12. Have you ever been bullied on the Internet by a third party?**

- ◯ Yes
- ◯ No
- ◯ Not sure

13. If your answer to the previous question is 'YES', were they:

- ◯ Known to you.
- ◯ Identifiable to you.
- ◯ Not known to you.
- ◯ Other (please specify):

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Online Uptake of eHealth Questionnaire

4. Please answer the following questions about the online provision of your PE...

Personal Information (PI) definition: PI is such information that may include one or more of the following items used to describe oneself (name, address, email address, telephone numbers, names of family members, social security, credit card number, financial information).

***14. How quickly after meeting people on the internet do you begin sharing personal details about yourself?**

- ◯ Extremely quickly
- ◯ Very quickly
- ◯ Quite quickly
- ◯ Not very quickly
- ◯ Not at all

***15. How often do you provide the following PERSONAL INFORMATION at any web site you visit generally? Please click the appropriate check box below.**

	Extremely Often	Very Often	Quite Often	Not Very Often	Not at all
I provide correct personal information on the Internet.	◯	◯	◯	◯	◯
I provide my personal information on the Internet to save time.	◯	◯	◯	◯	◯
I share personal details about myself with people I meet on the Internet.	◯	◯	◯	◯	◯
I am concerned when providing my credit card details when buying something online.	◯	◯	◯	◯	◯
I provide my personal information if the site is trustworthy.	◯	◯	◯	◯	◯
I provide my personal information for a service but sometimes I'm not sure if I can trust the site.	◯	◯	◯	◯	◯
I provide my income information when I need a certain service.	◯	◯	◯	◯	◯
I provide my health information to online trusted health web sites providing Healthcare services.	◯	◯	◯	◯	◯

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Online Uptake of eHealth Questionnaire

***16. To what extent do you agree with the following statements regarding the Internet, personal and health information exchange online. Please click on the appropriate check box indicating the degree of your agreement.**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I have the skills to use the Internet for various purposes.	○	○	○	○	○
The Internet as a resource is available and cheap.	○	○	○	○	○
I am extremely confident that my personal information is kept confidential when buying products/services online.	○	○	○	○	○
I am extremely confident that my personal information is kept confidential when browsing for information.	○	○	○	○	○
I feel that my personal information may be stolen or misused while I am online.	○	○	○	○	○
I am extremely confident that trusted health sites providing medical advice handle information in a proper manner.	○	○	○	○	○
I would be happy for my employer to have access to my health information.	○	○	○	○	○
Participating in an online health support group is safe with no risk of abuse of my information.	○	○	○	○	○
Participating in online health support groups helps to share experiences regarding a particular health issue.	○	○	○	○	○

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Online Uptake of eHealth Questionnaire

5. HEALTH INFORMATION and USE of eHEALTH

Please answer the following questions about the online provision of YOUR HEALTH INFORMATION and use of eHealth.

eHealth definition: eHealth refers to all forms of electronic health care delivered over the Internet, ranging from informational, educational, and commercial "products" to direct services offered by professionals, non-professionals, businesses, or consumers themselves.

***17. How physically healthy are you?**

- ◯ Extremely healthy
- ◯ To an extent healthy
- ◯ Moderately healthy
- ◯ Slightly healthy
- ◯ Not at all healthy

***18. To what extent do you agree with following statements regrading the health care services provided to you (patient-doctor relationship). Please click on the appropriate check box indicating the degree of your agreement.**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I am extremely satisfied with my doctor and medical care I receive.	◯	◯	◯	◯	◯
My doctor influences my decisions regarding my health care management and I would follow his recommendations in using eHealth	◯	◯	◯	◯	◯
My doctor answers my questions extremely well.	◯	◯	◯	◯	◯
I trust my doctor a great deal to make medical decisions that are in my best interests ad would follow his advice in using eHealth services.	◯	◯	◯	◯	◯
It is extremely easy to schedule urgent appointments with my doctor when I'm ill.	◯	◯	◯	◯	◯
I only go to the doctor when I am ill.	◯	◯	◯	◯	◯
I prefer going to my particular doctor regularly for check up.	◯	◯	◯	◯	◯
I am concerned about my children's health and visit their particular doctor regularly.	◯	◯	◯	◯	◯
It is extremely easy to talk to the staff at a hospital about my medical condition(s).	◯	◯	◯	◯	◯

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Online Uptake of eHealth Questionnaire

***19. To what extent do you agree with the following statements regarding the provision and use of different health services and online applications. Please click on the appropriate check box indicating the agree of your agreement.**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I am happy to receive health advice and prescriptions from my doctor Online if possible.	○	○	○	○	○
I am happy to give my medical details to my doctor on the phone.	○	○	○	○	○
I am happy to give my medical information to my doctor in his clinic.	○	○	○	○	○
I would believe that trustworthy and quality information regarding my medical condition, treatment or therapy is available online.	○	○	○	○	○
I am concerned that there may be online sources giving untrustworthy health/medical information.	○	○	○	○	○
I think I would be able and have the skills to identify trustworthy medical web sites when searching for medical information.	○	○	○	○	○
I will find it easy to use an official site of the Ministry of Health for browsing health information.	○	○	○	○	○
I would be happy to use an official online health service that may help answering questions about my medical condition, provide recommendations or provide a medical diagnosis.	○	○	○	○	○
I would be happy to use an official online health service that may help in directing my health condition to the specialised doctor.	○	○	○	○	○
Using an official telephone service that may help answer questions or diagnose my health condition will easy and free of effort.	○	○	○	○	○
It will be easy to Book appointments online.	○	○	○	○	○
It will be easier to access medical lab test results online.	○	○	○	○	○
Buying medicine online will be free of effort.	○	○	○	○	○
I would be happy to book appointments online	○	○	○	○	○
I would be happy to access medical lab test results online.	○	○	○	○	○
I would be happy to buy medicine online.	○	○	○	○	○
I would prefer face-to-face contact with my doctor rather than online consultation.	○	○	○	○	○

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Online Uptake of eHealth Questionnaire

***20. To what extent do you agree with the following statements. Please click the appropriate check box below indicating the degree of your agreement.**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I feel comfortable in using the Internet generally.	◯	◯	◯	◯	◯
I trust buying products online from a company I don't know.	◯	◯	◯	◯	◯
I Provide my health information in the hospital when seeing any doctor.	◯	◯	◯	◯	◯
Providing my health information to Internet pharmacies will enhance my effectiveness in managing my healthcare.	◯	◯	◯	◯	◯
Emailing doctors for health advice will be useful in managing my health care.	◯	◯	◯	◯	◯
Taking prescriptions from doctors online will be useful (saves time, increase effectiveness)	◯	◯	◯	◯	◯
Using personal health records services (such as MS Health Vault or Google Health) for storing health records wil support managing my heath care.	◯	◯	◯	◯	◯
Online access by hospitals to a summary of my health information without my consent if intended for medical reasons for my benefit will support critical aspect of my health care.	◯	◯	◯	◯	◯
Online access to my health information by my doctor.	◯	◯	◯	◯	◯
Accessibility of my electronic health information to all local hospitals will be useful.	◯	◯	◯	◯	◯
Accessibility of my health information by my Spouse or family (where relevant).	◯	◯	◯	◯	◯

***21. It would be better to engage in Internet transactions if the site is: (You may choose more than one answer)**

- ☐ Is trust worthy (says your information will be private).
- ☐ It shows that it works with trust a seal provider such as VeriSign.
- ☐ Has an understandable statement of its privacy policy.
- ☐ Is a reputable and well-known site.
- ☐ Is an official governmental site.
- ☐ Other (please specify)

***22. Which of the following best describes your approach to risk taking?**

◯ Very cautious ◯ Cautious ◯ Adventurous

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Online Uptake of eHealth Questionnaire

***23. To what extent do you agree with the following statements regarding the provision and use of your personal information by Government departments. Please click on the appropriate check box indicating the degree of your agreement.**

	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
I would like to be told which organisations or Government departments hold information about me.	◯	◯	◯	◯	◯
I would like to be told which organisations or Government departments are responsible for ensuring my data is correct.	◯	◯	◯	◯	◯
I would like to be told which other organisations or Government departments have access to my data and on what grounds.	◯	◯	◯	◯	◯
Citizens should be able to find out who has accessed information about them.	◯	◯	◯	◯	◯
I am satisfied with everything being done by those groups or officials in the control of my data to ensure it is not divulged to people who have no rights to read it.	◯	◯	◯	◯	◯
I am more aware and concerned about what uses of the data available on me are, than I was 10 years ago.	◯	◯	◯	◯	◯

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6. Demographic Data

***24. please choose your gender:**

- ◯ Male
- ◯ Female

***25. Please specify your Governate: If you are NOT EGYPTIAN please choose "other" and specify where you live.**

- ◯ Cairo
- ◯ Alexandria
- ◯ Other (please specify)

***26. Please specify your average monthly income from the range below (Egytpian Pounds):**

- ◯ Below 2,000
- ◯ 2,000- 4,000
- ◯ 4,000-6,000
- ◯ 6,000-10,000
- ◯ 10,000- 20,000
- ◯ Over 20,000
- ◯ Studying

***27. Please choose your marital status:**

- ◯ Single
- ◯ Married
- ◯ Have Children
- ◯ Separated
- ◯ Widowed

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***28. Which category below includes your age?**

- ◯ 18-20
- ◯ 21-29
- ◯ 30-39
- ◯ 40-49
- ◯ 50-59
- ◯ 60 or older

***29. Please specify your Nationality?**

***30. What is the highest level of school you have completed or the highest degree you have received?**

- ◯ Less than high school degree
- ◯ Some college but no degree
- ◯ Postgraduate degree
- ◯ Bachelor degree
- ◯ High school degree or equivalent
- ◯ Student
- ◯ Other (please specify)

***31. Which of the following categories best describes your employment status?**

- ◯ Employed
- ◯ Unemployed
- ◯ Retired
- ◯ Unable to work
- ◯ Studying

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***32. If you are employed, please specify your employment sector. (If you are a student please select "Student" from the list)**

- ◯ Education
- ◯ Engineering
- ◯ Computer Science
- ◯ Finance/Banking
- ◯ Agriculture
- ◯ Trade /Export/Import
- ◯ Manufacturing
- ◯ Sports
- ◯ Media
- ◯ Communications
- ◯ Medicine
- ◯ Other (please specify)
- ◯ Science (Geology, Chemical, Petroleum.)
- ◯ Maritime
- ◯ Service Industry
- ◯ Police
- ◯ Military Force
- ◯ Information Technology/ Information Systems
- ◯ Pharmaceutical
- ◯ Business Administration
- ◯ Automotive
- ◯ Student

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Appendix B-1

Interview 1 Questions Guide (MOHP officials)

Q1: Has there been any research conducted in Egypt on eHealth?

Q2: What is the state of art regarding eHealth in Egypt?

Q3: Were there any surveys distributed to citizens testing their acceptance of Health?

Q4: Is there plan for an eHealth initiative in Egypt?

Q5: What is the automation status of public hospitals and clinics in Egypt?

Q6: Do hospitals and clinics use computers in their daily transactions or to keep record patient health records?

Q7: Are there any databases of patient health records?

Q8: Regarding eHealth use, is it important for respondents answering the questionnaire to be computer and Internet iterate? Who do you think that this research should be directed to?

Q9: Can the MOHP collaborate with the researcher by any means? (questionnaire distribution).

Q10: Are doctors trained on IT technology? (Computer/Internet skills and proficiency)

Appendix B-2 Follow up Interview questions guide (All parties - MOHP officials, Hospital Mangers and Doctors)

Q1: What is the current automation status of public hospitals and clinics in Egypt?

Q2: Do hospitals and clinics use computers in their daily transactions or keep record patient health records?

Q3: Are there any databases of patient health records?

Q4: What are the Government budget allocations to the MOHP (where relevant to the interviewed party).

Q5: Regarding eHealth use, is it important for respondents answering the questionnaire to be computer and Internet iterate? Who do you think that this research should be directed to?

Q6: Are doctors trained on IT technology? (Computer/Internet skills and proficiency)

Q7: Are there any current electronic health services offered to citizens or doctors?

Q8: Who will have access to the medical records when automation is complete (where relevant)?

Q9: Do you think information privacy affects the acceptance of eHealth?

Q10: What are the benefits of using ehealth systems from your perspective? Do you perceive it as useful? How?

Q11: Would eHealth be easy to use? How?

Q12: Do you think online trust is important when accessing ehealth services?

Appendix C – Factor Analysis

Performance Expectancy

Component Matrix[a]

	Component
	1
Q20d_ Providing my health information to Internet pharmacies will enhance my effectiveness in managing my healthcare.	.768
Q20e_Emailing doctors for health advice will be useful in managing my health care.	.785
Q20f_aking prescriptions from doctors online will be useful (saves time, increase effectiveness).	.756
Q20g_Using personal health records services (such as MS Health Vault or Google Health) for storing health records will support managing my heath care.	.788
Q20h_Online access by hospitals to a summary of my health information without my consent if intended for medical reasons for my benefit will support critical aspects of my health care.	.781
Q20j_Accessibility of my electronic health information to all local hospitals will be useful.	.748

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Effort Expectancy

Component Matrix[a]

	Component	
	1	2
Q19k_It will be easy to book appointments online.	.857	-.169
Q19L_It will be easier to access medical lab test results online.	.787	-.372
Q19M_Buying medicine online will be free of effort.	.784	-.172
Q19g_I will find it easy to use an official site of the Ministry of Health for browsing health Information.	.379	.794
Q19j_Using an official telephone service that may help answer questions or diagnose my health condition will easy and free of effort.	.600	.453

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Behavioural Intention

Component Matrix[a]

	Component	
	1	2
Q19a_I am happy to receive health advice and prescriptions from my doctor Online if possible.	.564	.303
Q19O_I would be happy to access medical lab test results online.	.737	-.463
Q19p_I would be happy to buy medicine online.	.713	-.372
Q19i_I would be happy to use an official online health service that may help in directing my health condition to the specialised doctor.	.771	.431
Q19h_I would be happy to use an official online health service that may help answering questions about my medical condition, provide recommendations or provide a medical diagnosis.	.717	.464
Q19n_I would be happy to book appointments online.	.783	-.385

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Internet Experience and Exposure

Component Matrix[a]

	Component	
	1	2
Internet Frequency of use for work related research	.600	-.486
Internet Frequency of use for personal finance	.641	-.331
Travel-related search (travel tickets, hotel reservations, trip reservations).	.685	-.247
Product information gathering.	.729	.113
Communicating with others (e.g. chat/email/video chat/facebook etc.).	.468	.540
Browsing for health information.	.567	.458
Internet Frequency of use for education	.530	-.174
Internet Frequency of use for current events	.500	.340

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Online Trust

Component Matrix[a]

	Component		
	1	2	3
Q1_ Buy products online.	.682	-.488	-.190
Q1_Buy services online.	.693	-.537	-.028
Q16c_I am extremely confident that my personal information is kept confidential when buying products/services online.	.656	.470	-.176
Q16d_I am extremely confident that my personal Information is kept confidential when browsing for Information.	.588	.532	-.190
Q16f_I am extremely confident that trusted health sites providing medical advice handle information in a proper manner.	.391	.462	.501
Q20b_I would trust buying products online from a company I don't know.	.593	.181	-.479
Q15h_I provide my health Information to online trusted health web sites providing Healthcare services.	.530	.050	.633
Q5L_Using Health-related activities (e.g. online health advice, online prescriptions or online appointment booking).	.597	-.386	.231

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Facilitating Conditions

Component Matrix[a]

	Component			
	1	2	3	4
Q1c_Ease of use Digital Camera	.770	-.281	.019	.191
Q1d_Ease of use Digital Alarm	.703	-.342	.085	.248
Q1e_Ease of use DVD	.738	-.253	-.033	.194
Q1h_Ease of use Laptop	.679	.151	-.012	-.300
Q1i_Ease_of use Printer	.794	.061	-.018	-.306
Q1j_Ease of use Scanner	.722	.038	-.123	-.182
Q3a_Home	.083	-.092	.627	-.021
Q3b_Work	-.177	-.352	.618	.345
Q3c_Internet cafe	-.106	-.289	.519	-.510
Q16a_I have the skills to use the Internet for various purposes.	.191	.612	.328	-.120
Q16b_The Internet as a resource is available and cheap.	.251	.587	.415	.094
Q19f_I think I would be able and have the skills to identify trustworthy medical web sites when searching for medical information.	.237	.487	.030	.510

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Privacy Attitudes and Concerns

Component Matrix[a]

	Component	
	1	2
Q14_ How quickly after meeting people on the internet do you begin sharing personal details about yourself?	.542	-.646
Q15a _I provide correct personal Information on the Internet	.605	.182
Q15c_ I share personal details about myself with people I meet on the Internet	.713	-.469
Q15d_ I am concerned when providing my credit card details when buying something online.	.499	.623
Q15e_I provide my personal information if the site is trustworthy	.665	.356
Q15f_I provide my personal Information for a service but sometimes Im not sure if I can trust the site	.713	-.058
Q15g _I provide my income information when I need a certain service	.679	.086

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Social Influence

Component Matrix[a]

	Component
	1
Q18b_My doctor influences my decisions regarding my health care management and I follow his recommendations in using eHealth.	.899
Q18d_I trust my doctor a great deal to make medical decisions that are in my best interests ad would follow his advice in using eHealth services.	.899

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Satisfaction with Medical Care

Component Matrix[a]

	Component
	1
Q18a_I am extremely satisfied with my doctor and medical care I receive.	.904
Q18c_My doctor answers my questions extremely well	.904

Extraction Method: Principal Component Analysis.

a. 1 components extracted.